US009858905B2

(12) **United States Patent**
Tanabe

(10) **Patent No.: US 9,858,905 B2**
(45) **Date of Patent: Jan. 2, 2018**

(54) **MOUNTING DEVICE FOR CYMBAL TYPE PERCUSSION INSTRUMENT**

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(72) Inventor: **Emi Tanabe**, Hamamatsu (JP)

(73) Assignee: **YAMAHA CORPORATION**, Hamamatsu-Shi (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/001,869**

(22) Filed: **Jan. 20, 2016**

(65) **Prior Publication Data**

US 2016/0210945 A1 Jul. 21, 2016

(30) **Foreign Application Priority Data**

Jan. 21, 2015 (JP) 2015-009526
Jul. 27, 2015 (JP) 2015-147551

(51) **Int. Cl.**
G10D 13/02 (2006.01)
G10D 13/06 (2006.01)

(52) **U.S. Cl.**
CPC ***G10D 13/06*** (2013.01)

(58) **Field of Classification Search**
USPC 84/402
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,037,509	A *	7/1977	Slomovits	G10D 13/06 84/422.3
5,959,227	A *	9/1999	Shapiro	G10D 13/06 84/411 M
5,969,281	A *	10/1999	Suenaga	G10G 5/00 84/421
9,099,072	B2 *	8/2015	Yoshino	G10D 13/06
2014/0083276	A1	3/2014	Yoshino	
2015/0269921	A1 *	9/2015	Truchsess	G10D 13/06 84/422.1

FOREIGN PATENT DOCUMENTS

JP	08272359	A	10/1996
JP	11184459	A	7/1999
JP	5224918		7/2013
JP	2014066832	A	4/2014

OTHER PUBLICATIONS

Ikebe New Product Press. The Next Generation of "Noise Dampers" Cymbals from Zildjian, GEN16 Buffed Bronze appeared! pp. 1-8. URL:http://www.ikebe-gakki-pb.com/new_product/?p=3286. Retrieved on Jun. 19, 2015. Partial English translation provided.

* cited by examiner

Primary Examiner — Christopher Uhlir
(74) *Attorney, Agent, or Firm* — Rossi, Kimms & McDowell LLP

(57) **ABSTRACT**

A mounting device for a cymbal type percussion instrument, the cymbal type percussion instrument which includes at least one cymbal that is supported on a support, the mounting device includes: a mounting member which is mounted in at least two different positions on the cymbal type percussion instrument, the mounting member which is configured to suppress motion of the cymbal when the mounting member is mounted in the at least two different positions on the cymbal type percussion instrument so as to hold a position of the mounting member relative to the cymbal.

13 Claims, 16 Drawing Sheets

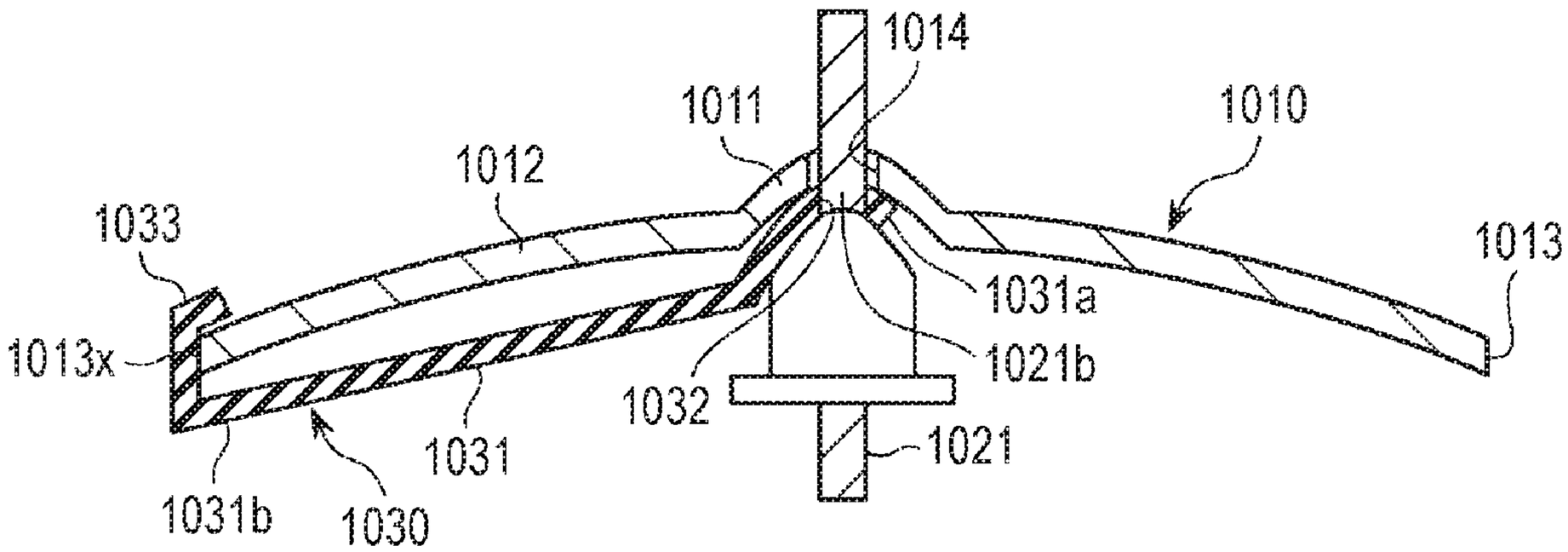


FIG. 1A

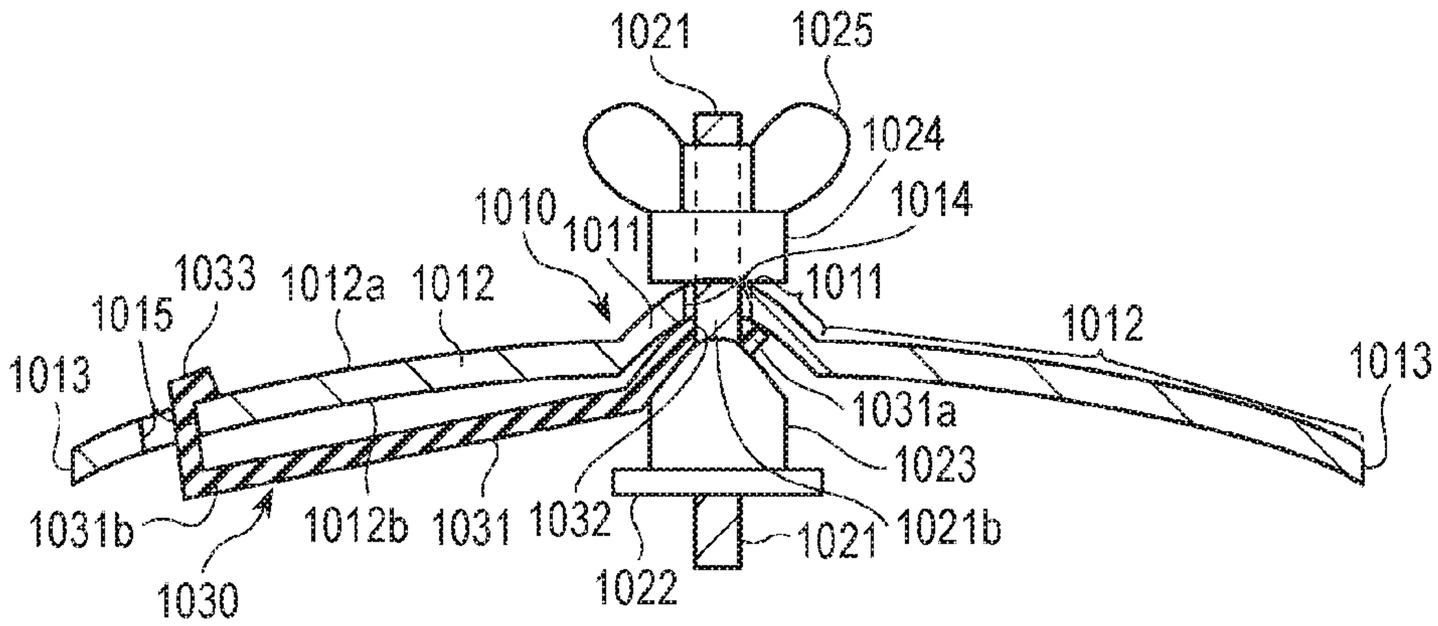


FIG. 1B

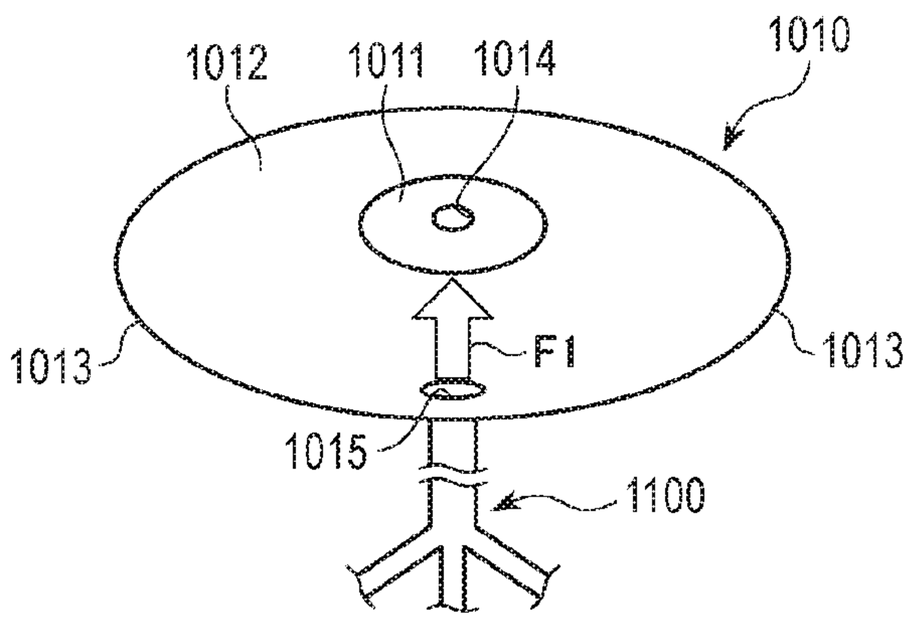


FIG. 1C

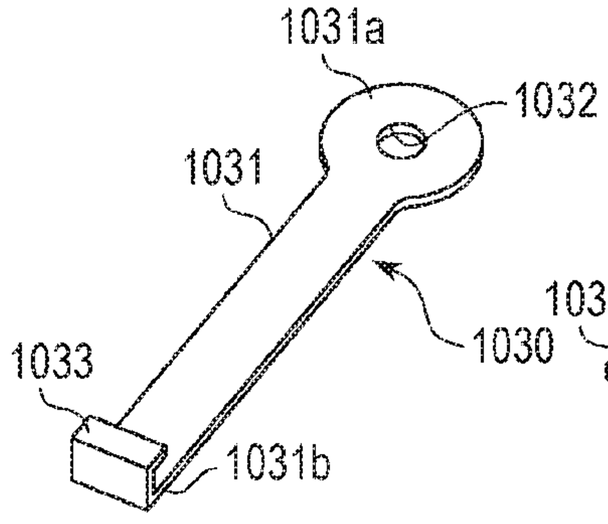


FIG. 1D

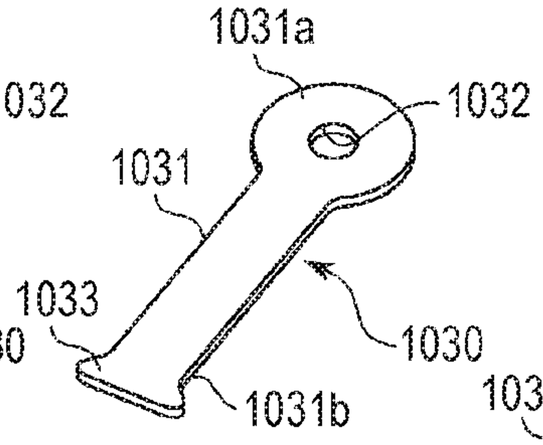
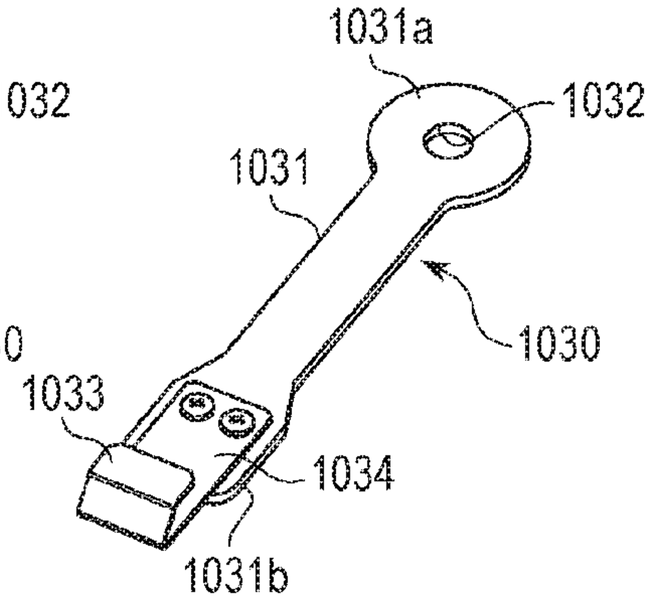


FIG. 1E



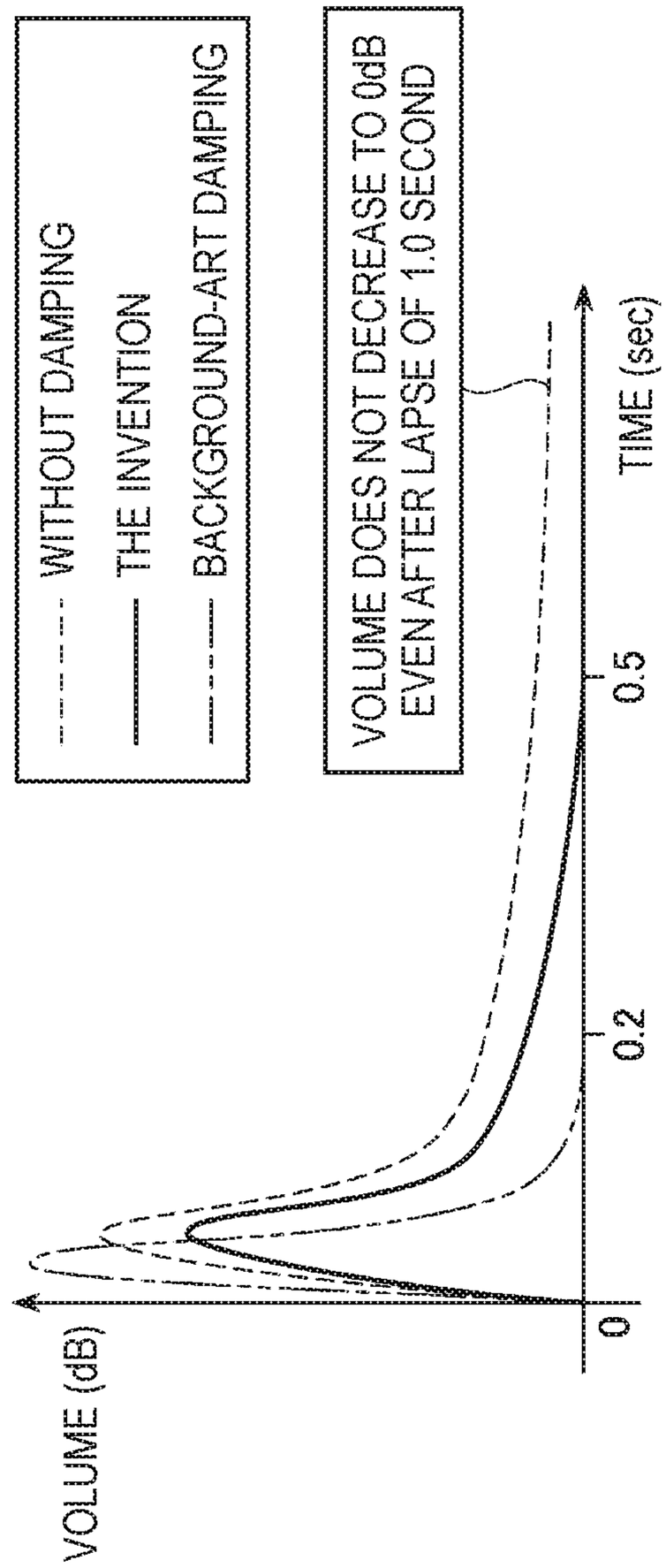
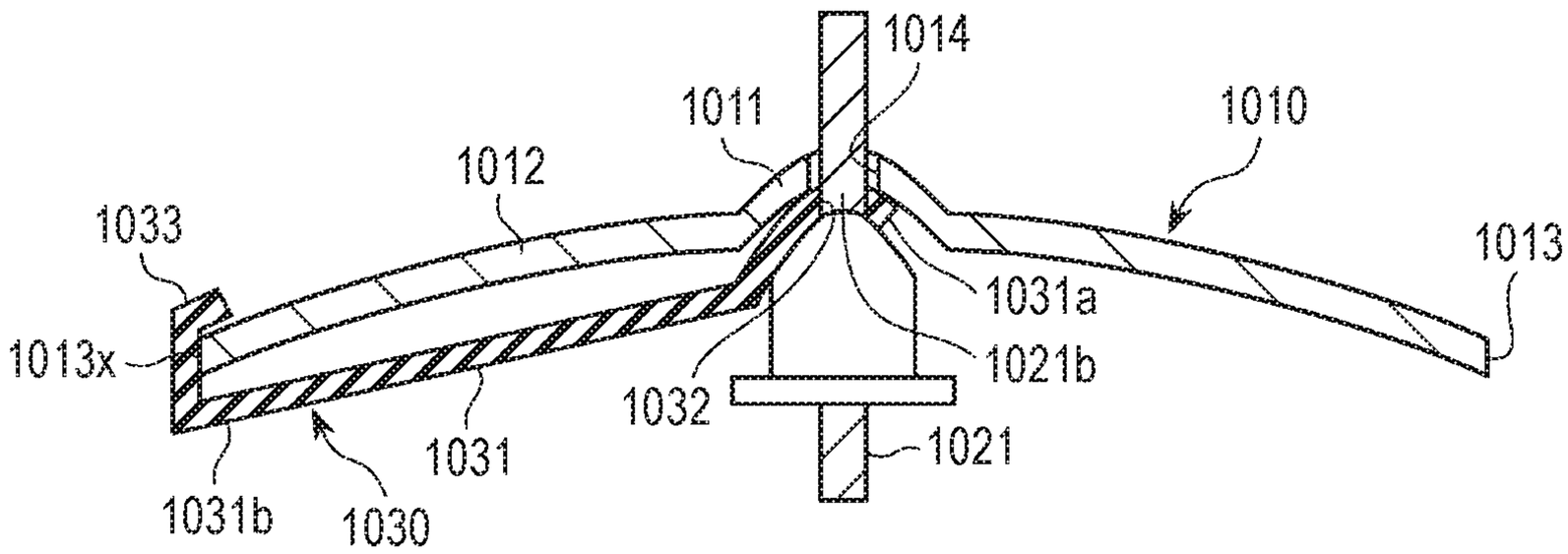

VOLUME (dB)
TIME (sec)
0
0.2
0.5
WITHOUT DAMPING
THE INVENTION
BACKGROUND-ART DAMPING
VOLUME DOES NOT DECREASE TO 0dB
EVEN AFTER LAPSE OF 1.0 SECOND

FIG. 2

FIG. 3A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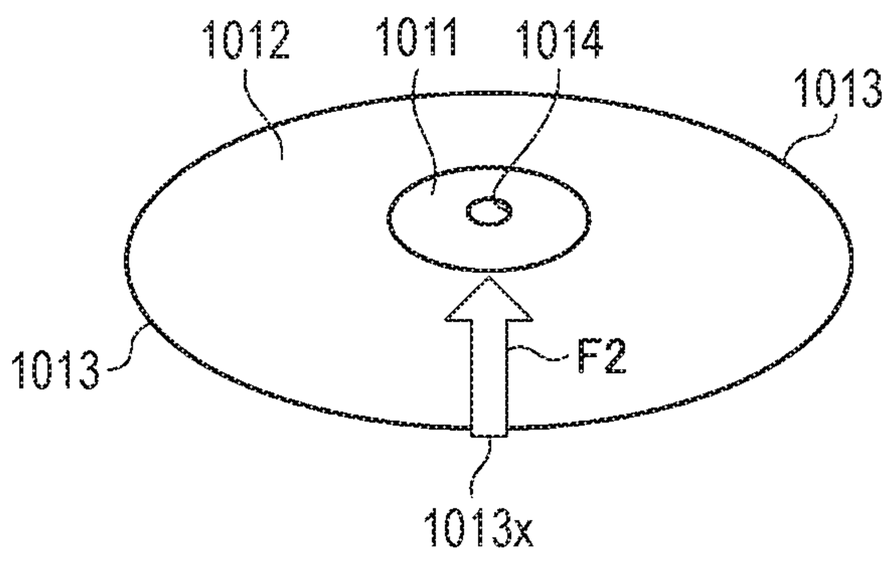
1031a
1021b
1032
1031
1021
1031b
1030

FIG. 3B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1014
1013
1013
F2
1013x

FIG. 4A

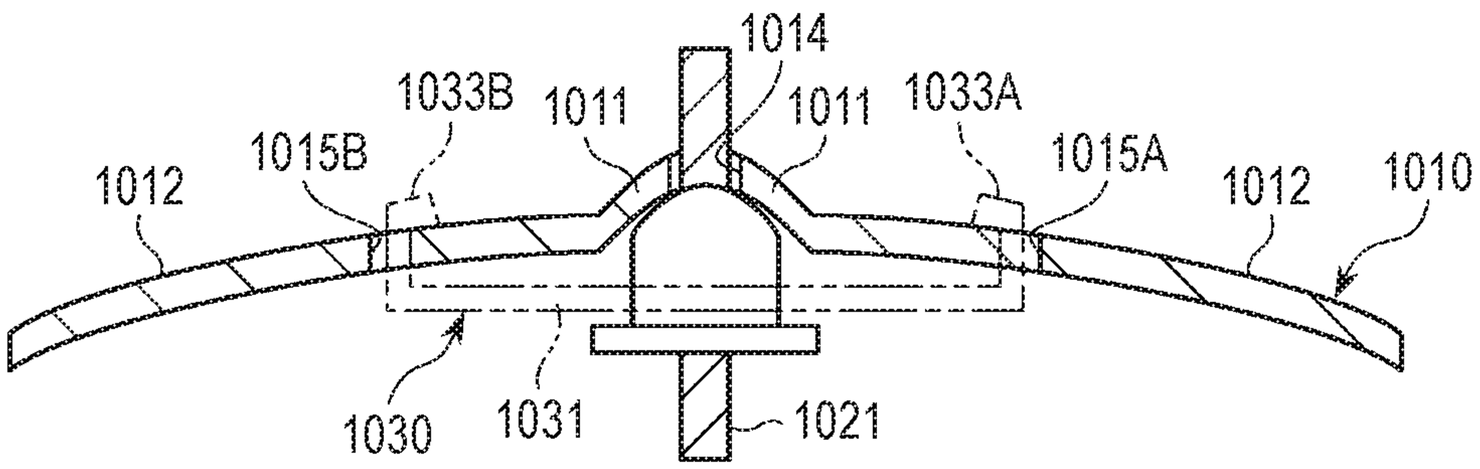


FIG. 4B

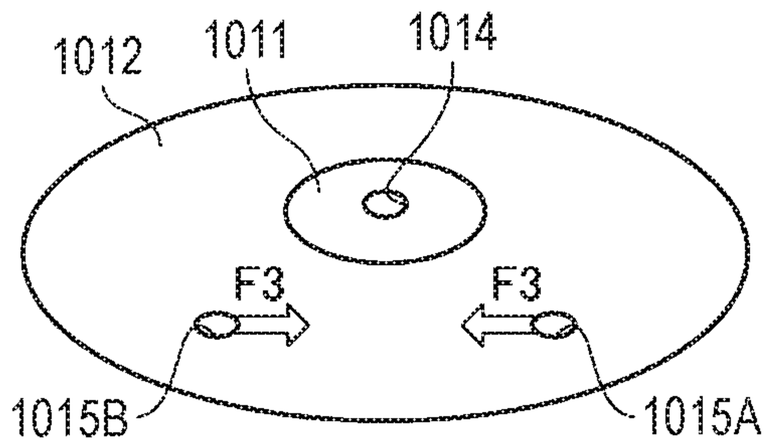


FIG. 4C

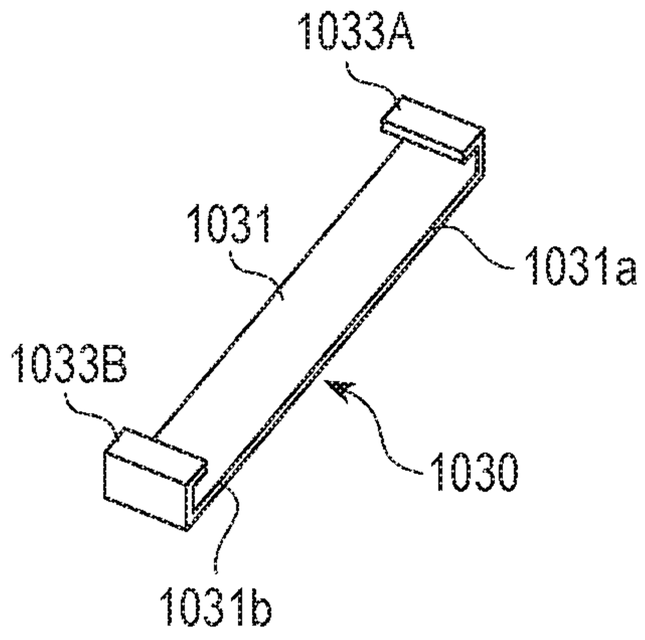


FIG. 4D

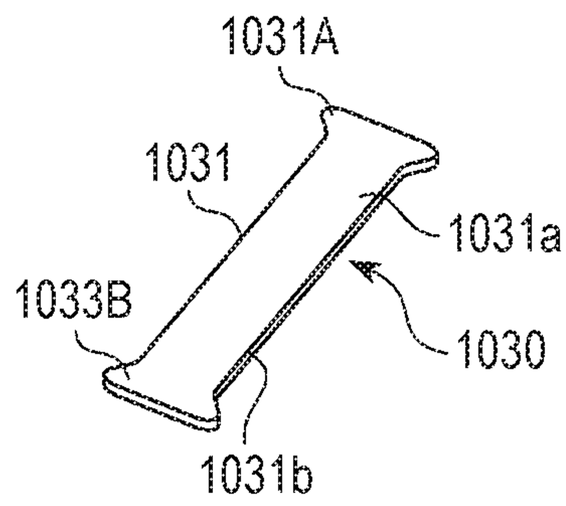


FIG. 5A

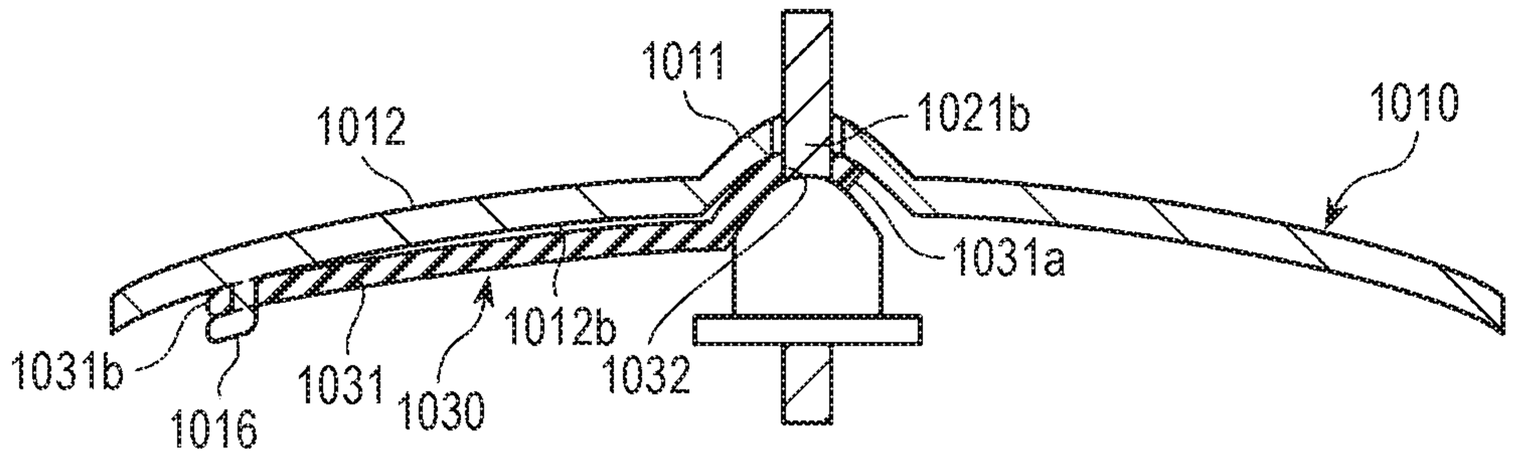


FIG. 5B

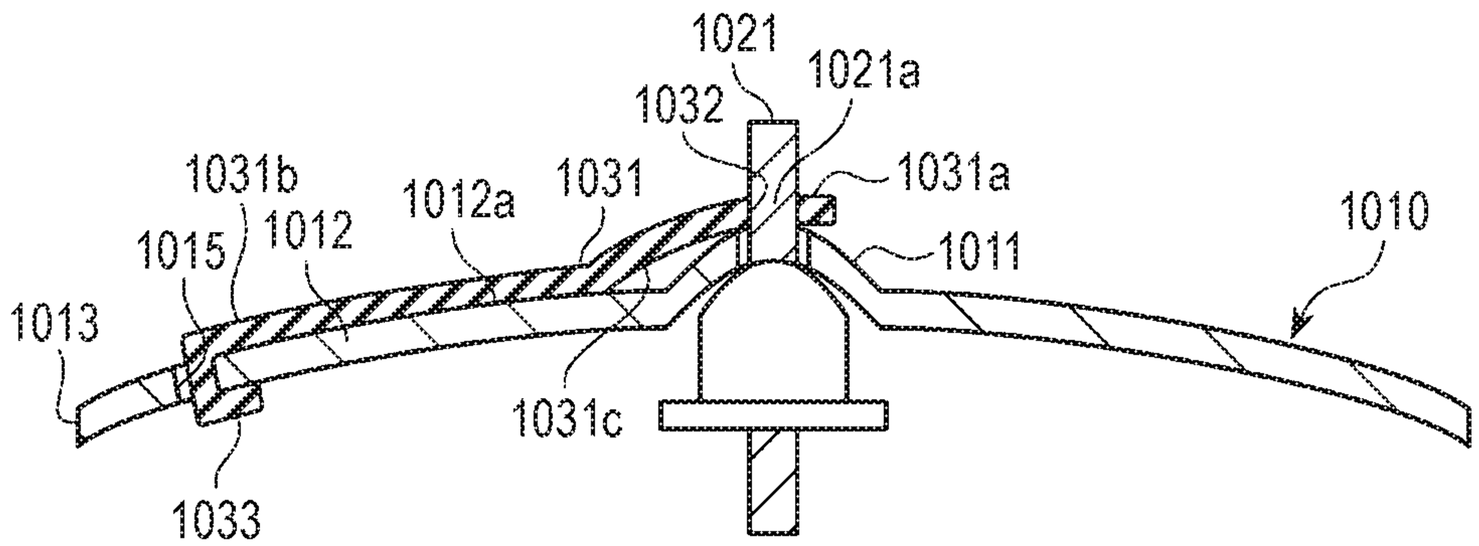


FIG. 5C

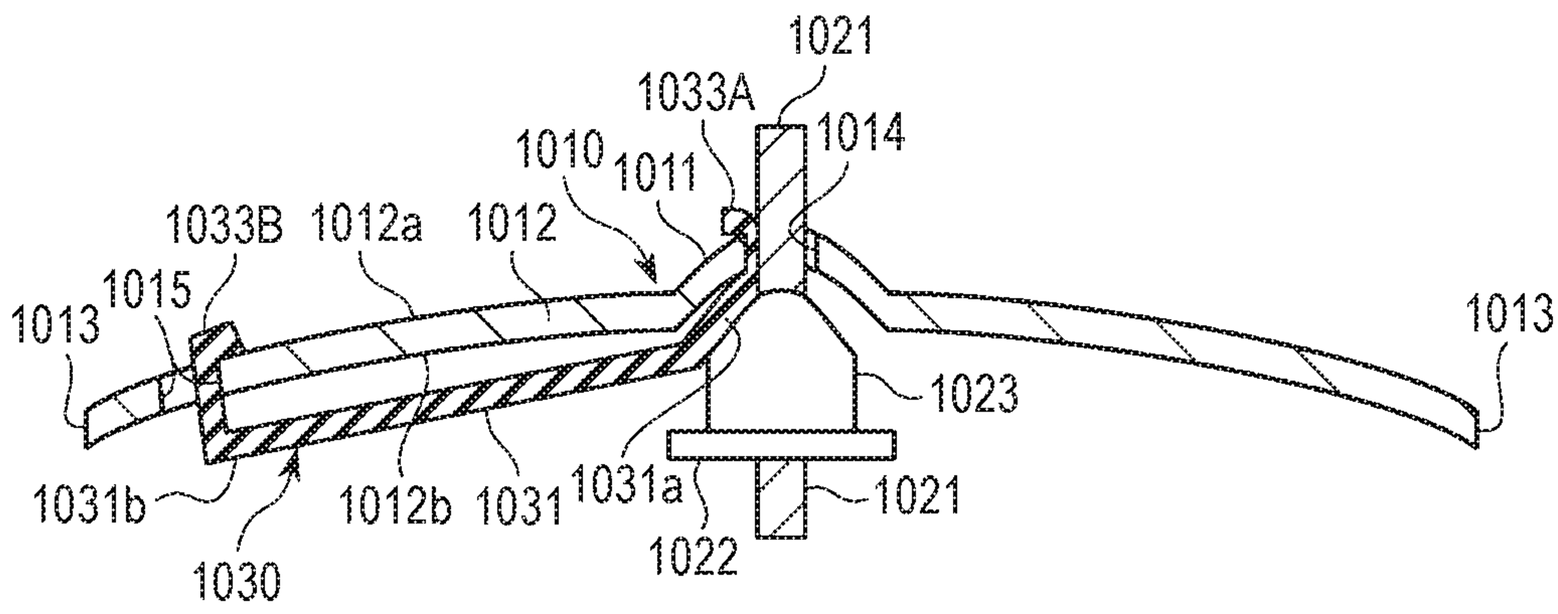


FIG. 6A

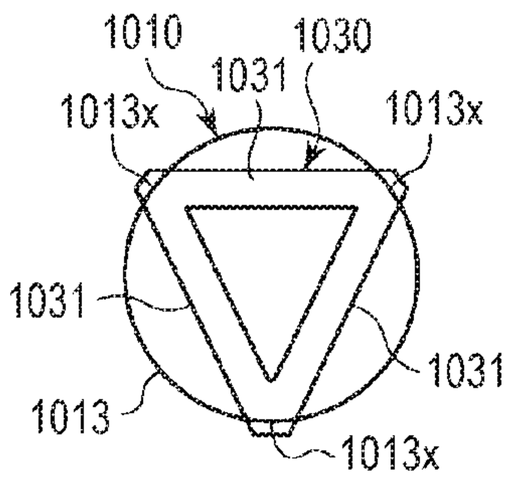


FIG. 6B

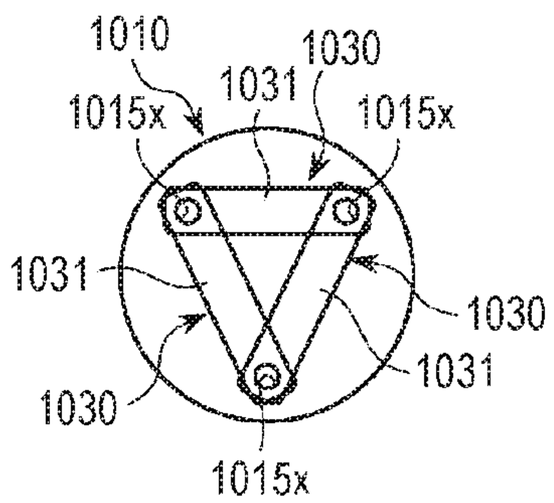


FIG. 6C

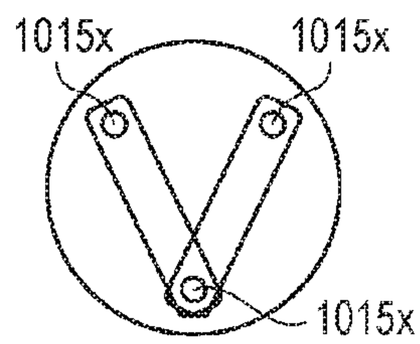


FIG. 6D

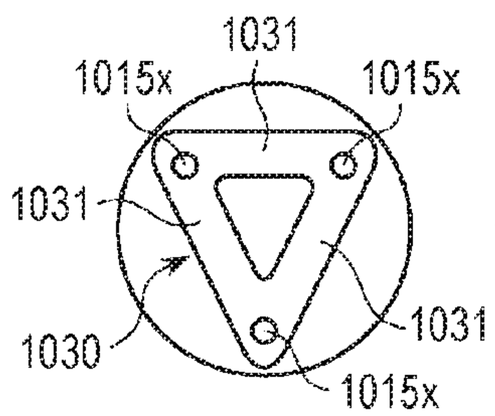


FIG. 6E

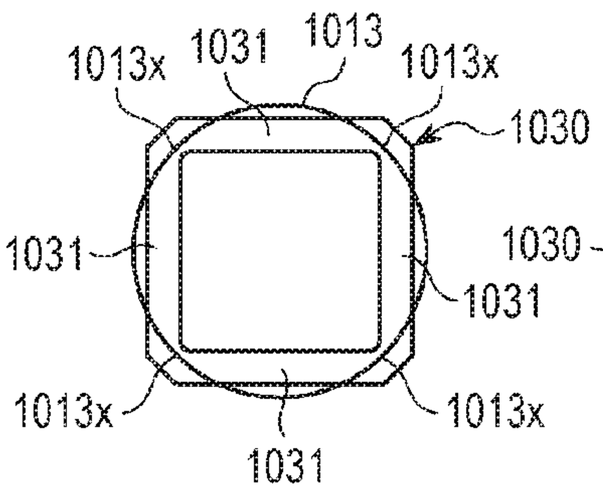


FIG. 6F

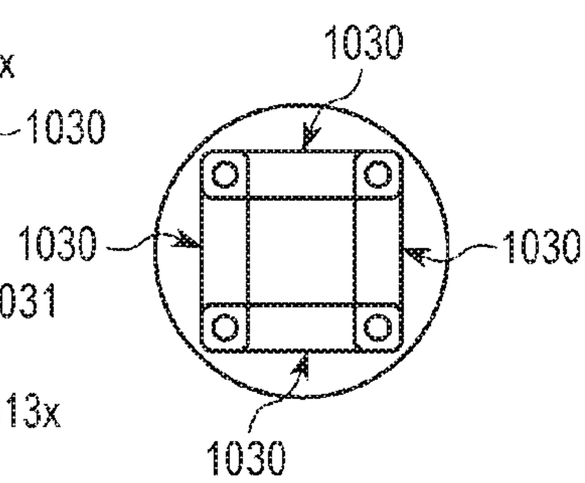


FIG. 6G

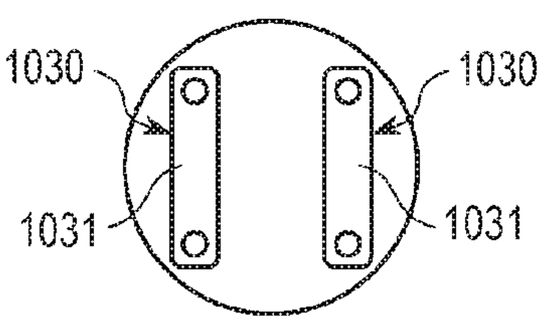


FIG. 6H

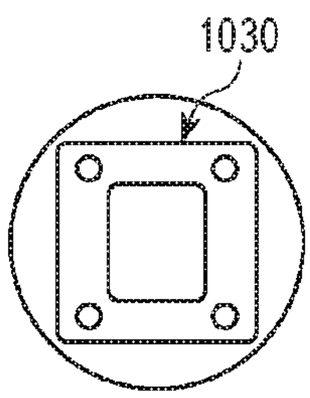


FIG. 6I

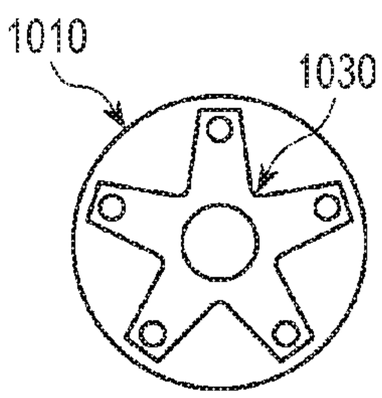


FIG. 6J

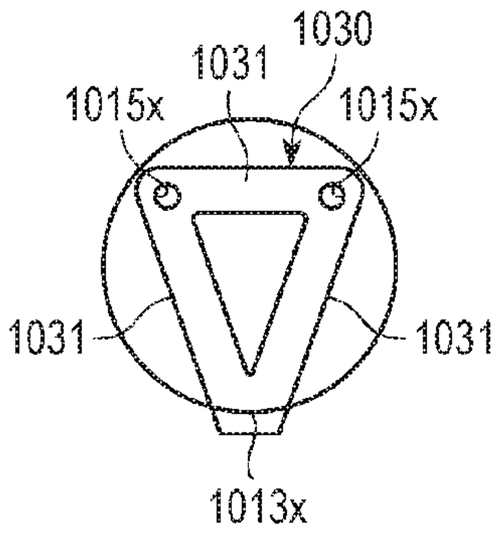


FIG. 6K

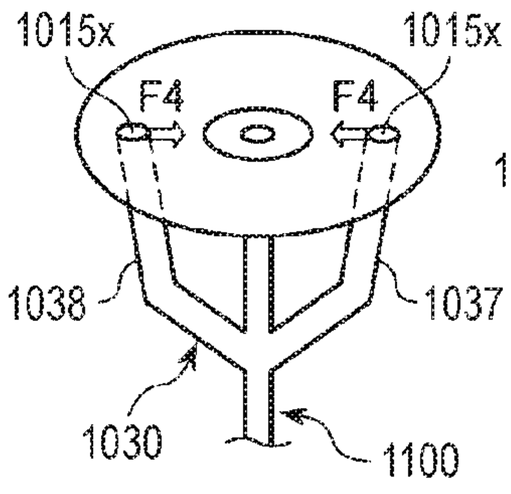


FIG. 6L

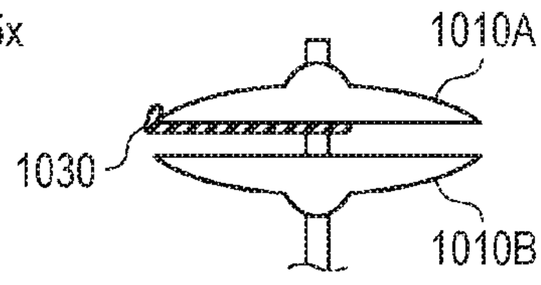


FIG. 7A

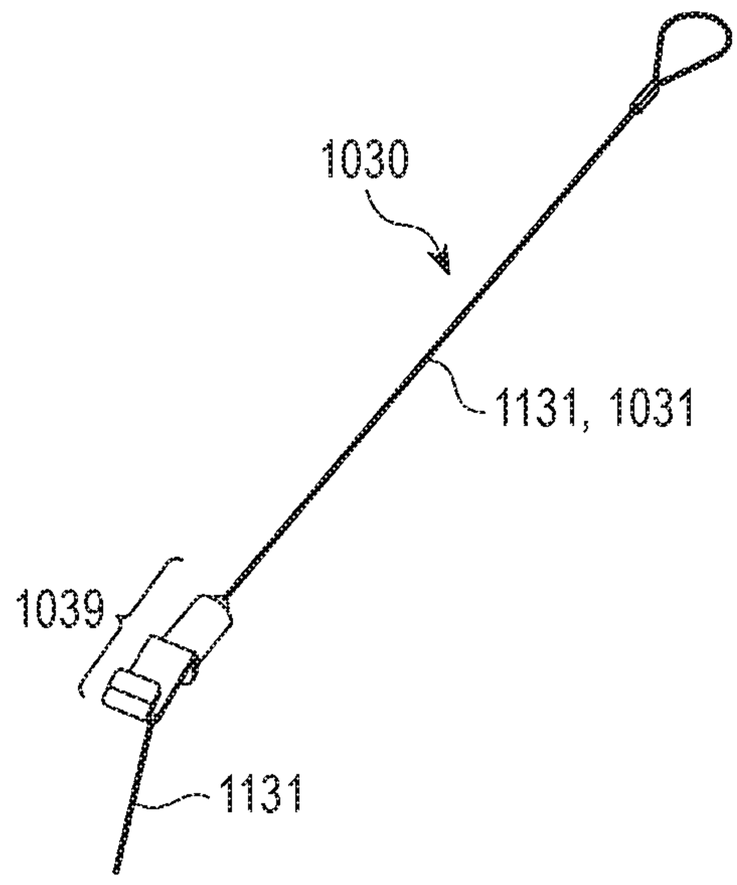


FIG. 7B

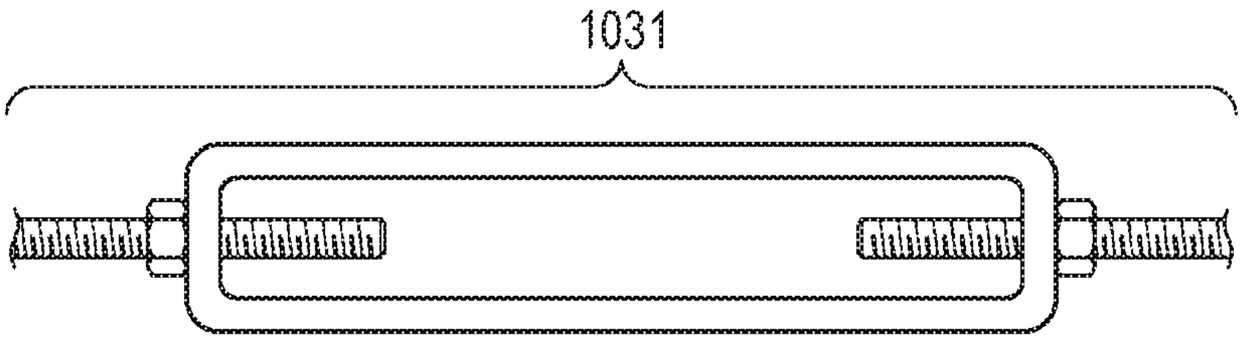


FIG. 7C

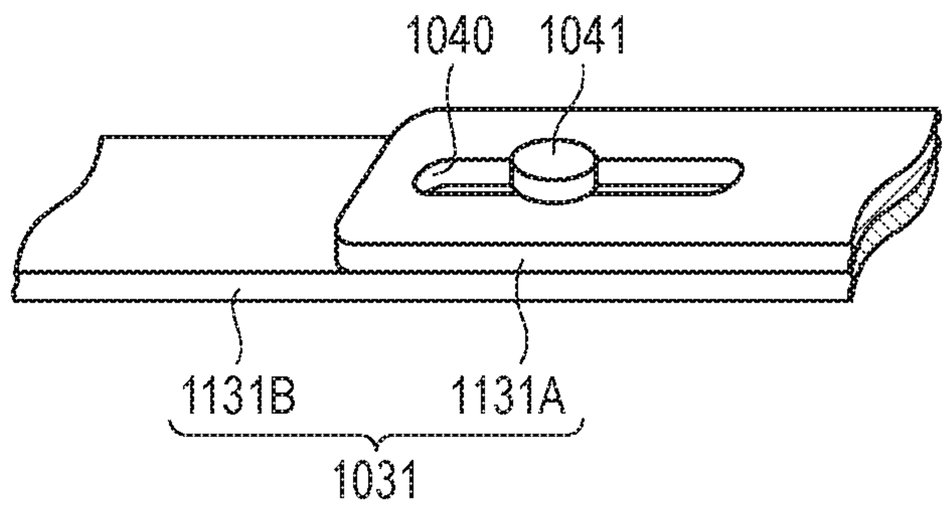
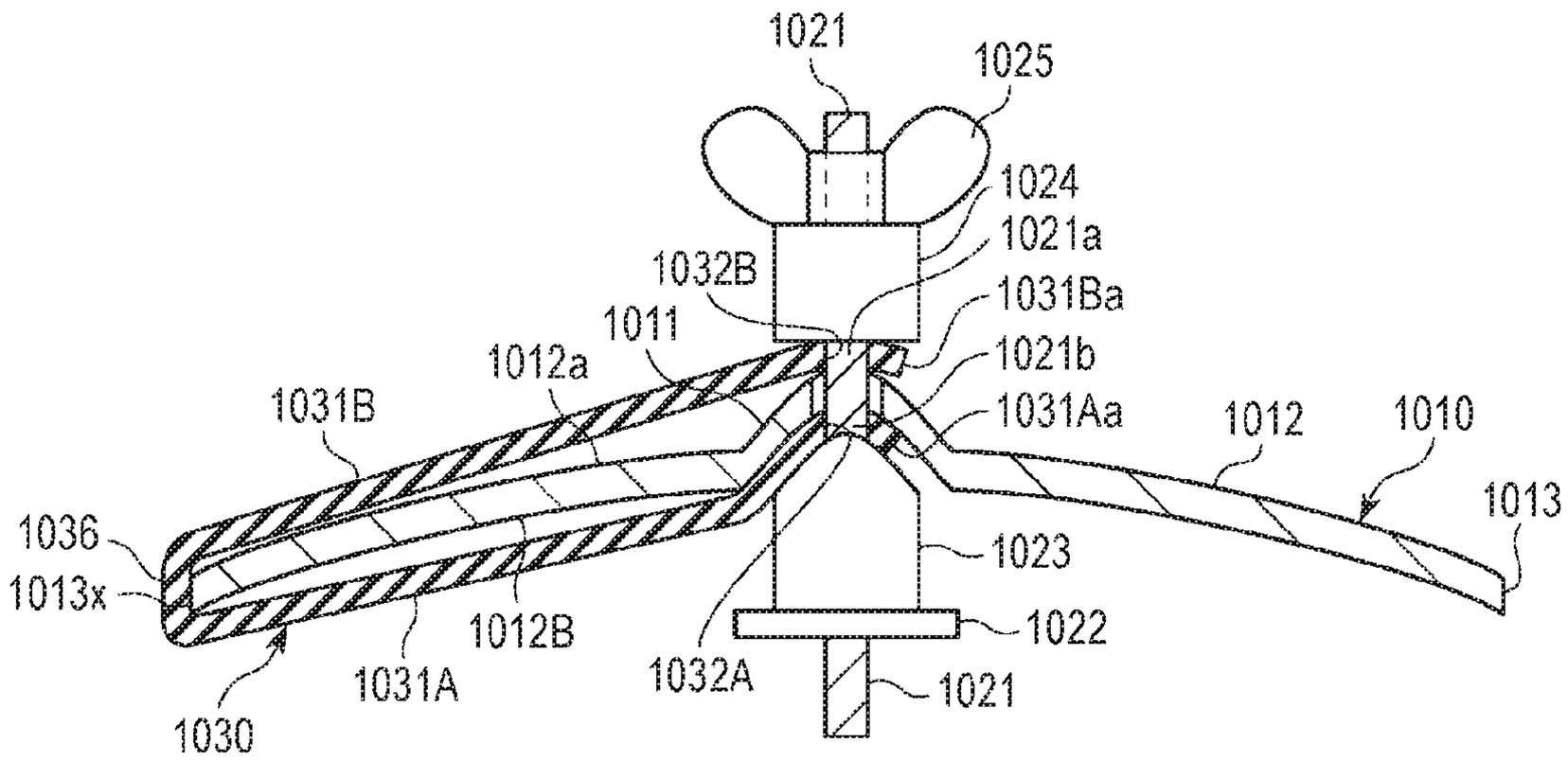


FIG. 8A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1025
1024
1021a
1032B
1031Ba
1011
1012a
1021b
1031B
1031Aa
1012
1010
1013
1036
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1013x
1022
1012B
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1021
1030

FIG. 8B

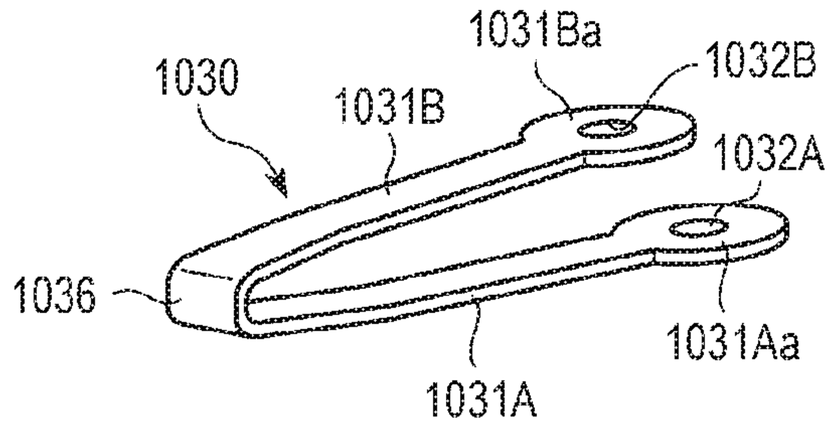
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FIG. 9A

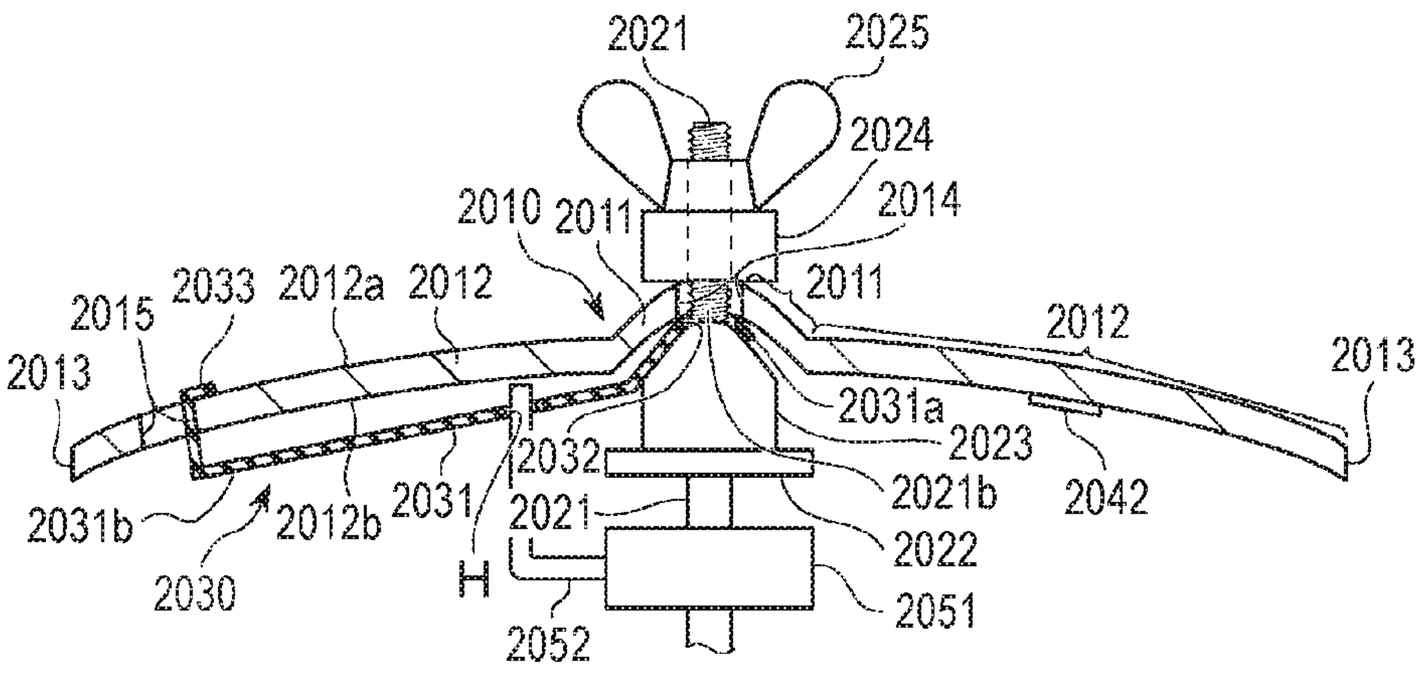


FIG. 9B

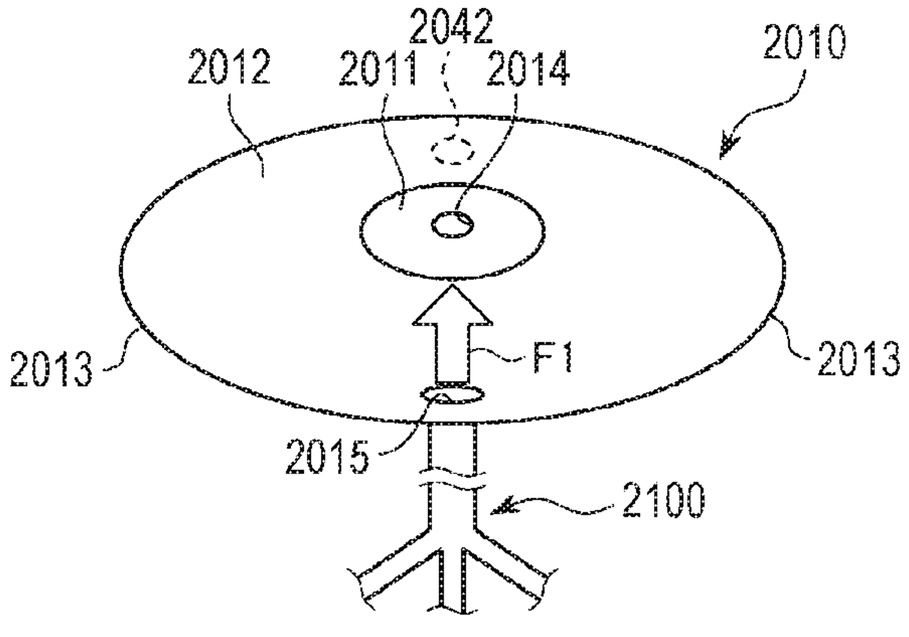


FIG. 9C

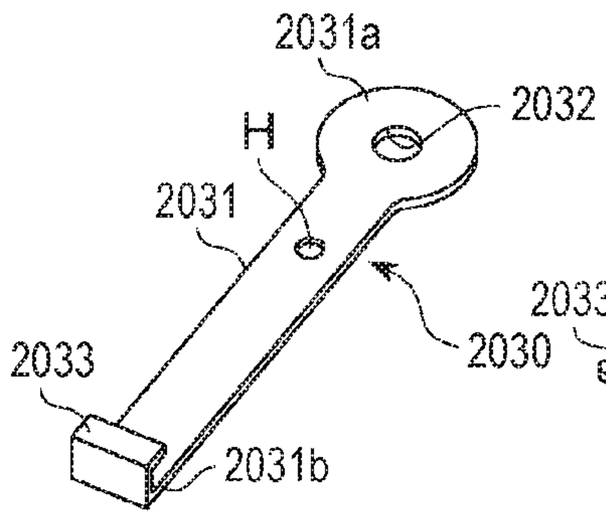


FIG. 9D

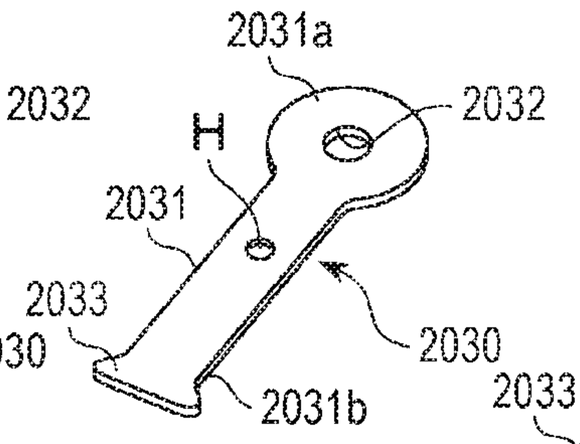
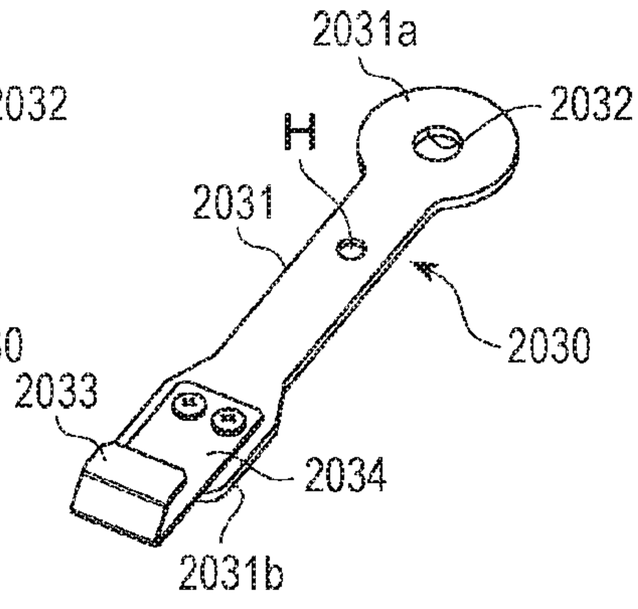


FIG. 9E



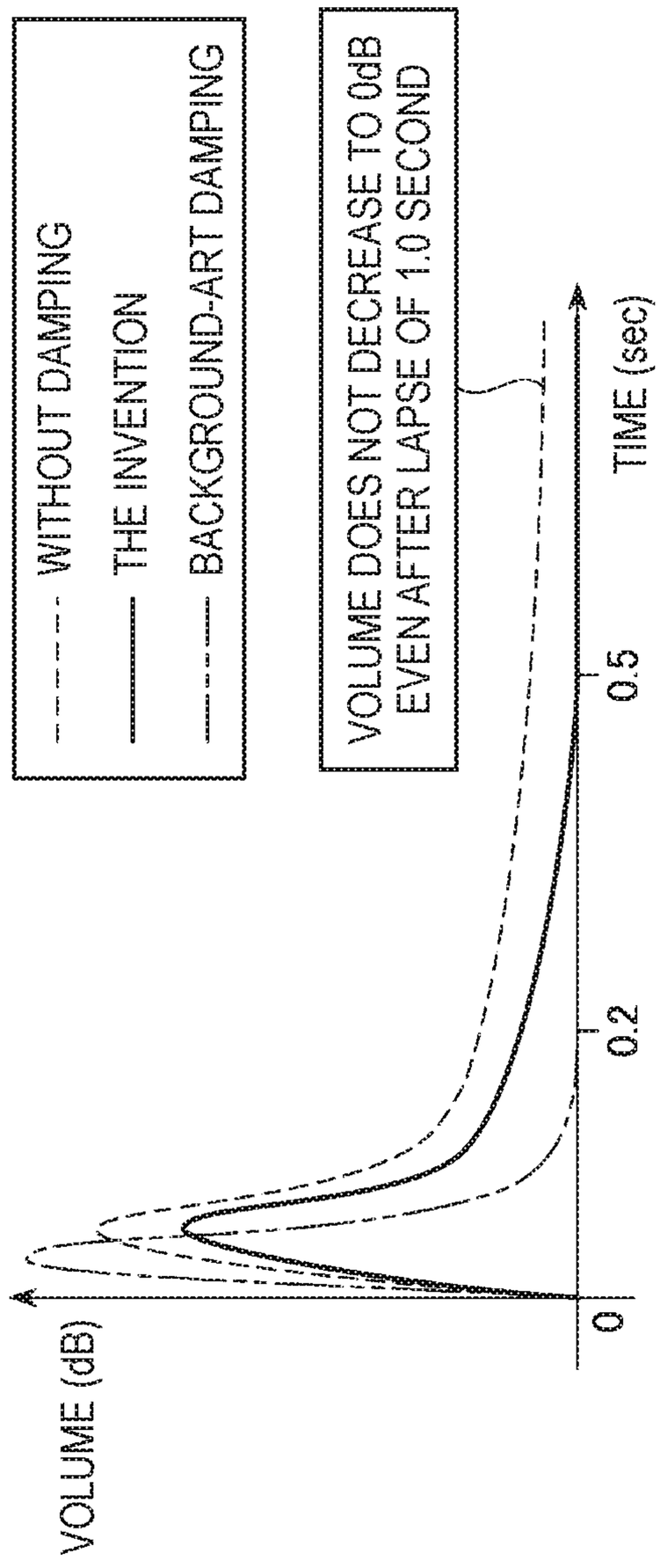

WITHOUT DAMPING
THE INVENTION
BACKGROUND-ART DAMPING
VOLUME DOES NOT DECREASE TO 0dB
EVEN AFTER LAPSE OF 1.0 SECOND
VOLUME (dB)
0
0.2
0.5
TIME (sec)

FIG. 10

FIG. 11A

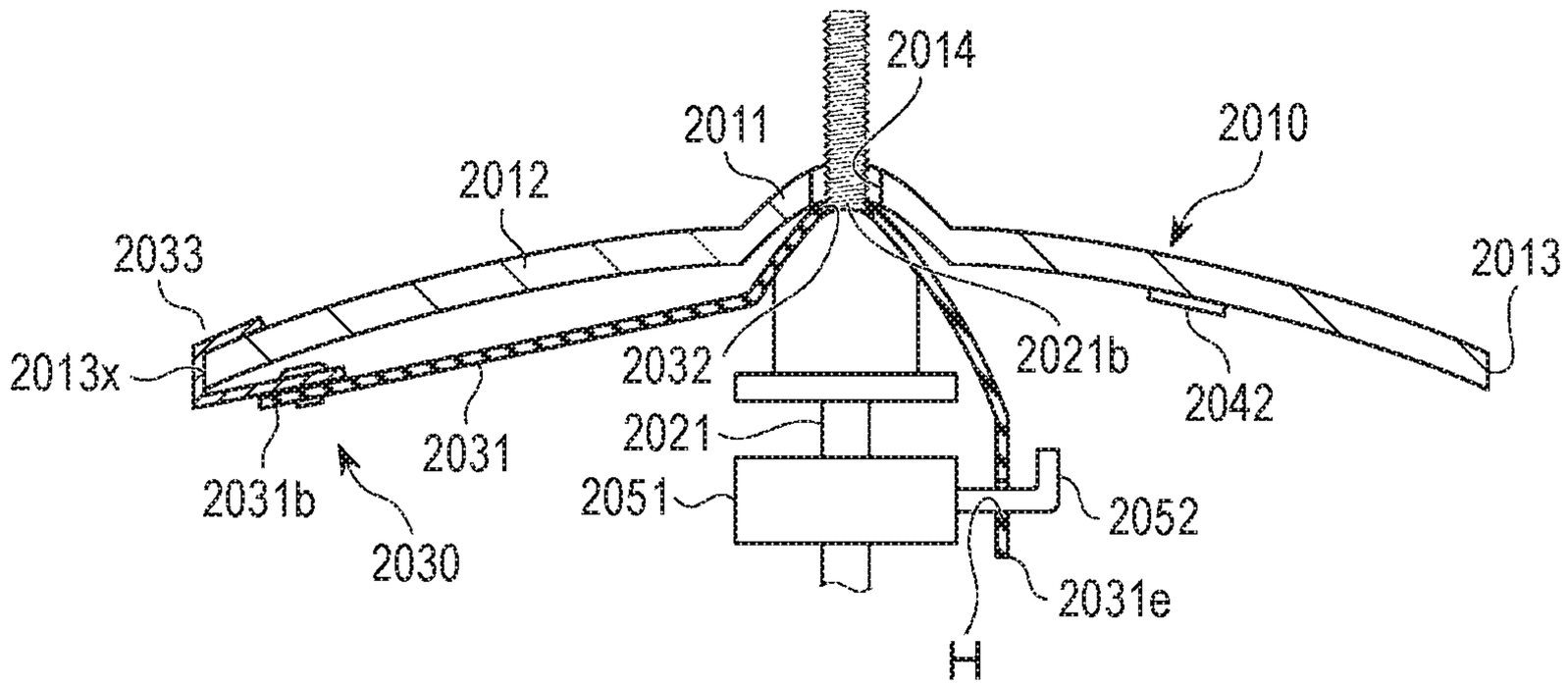


FIG. 11B

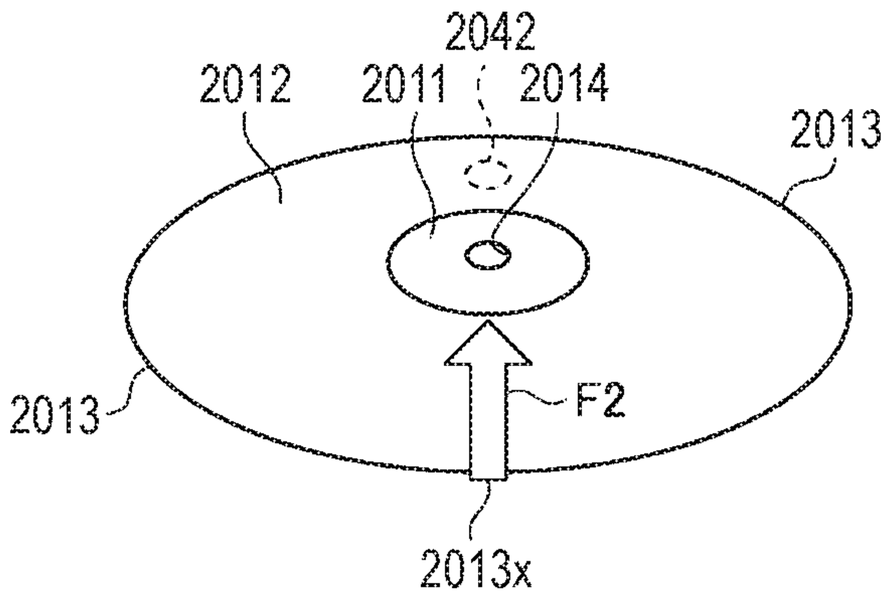


FIG. 11C

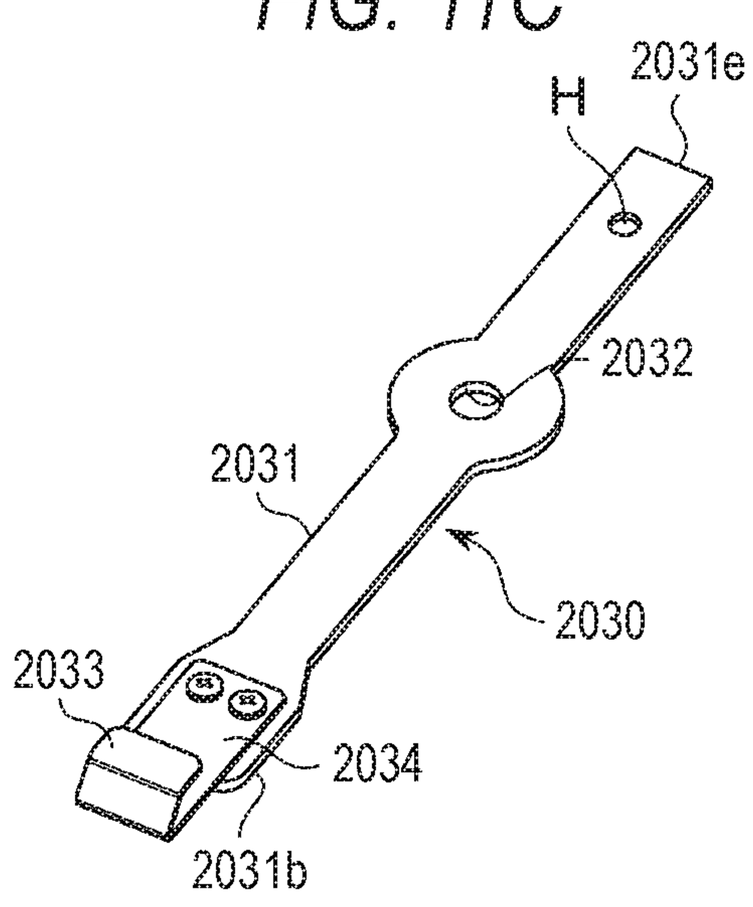


FIG. 12A

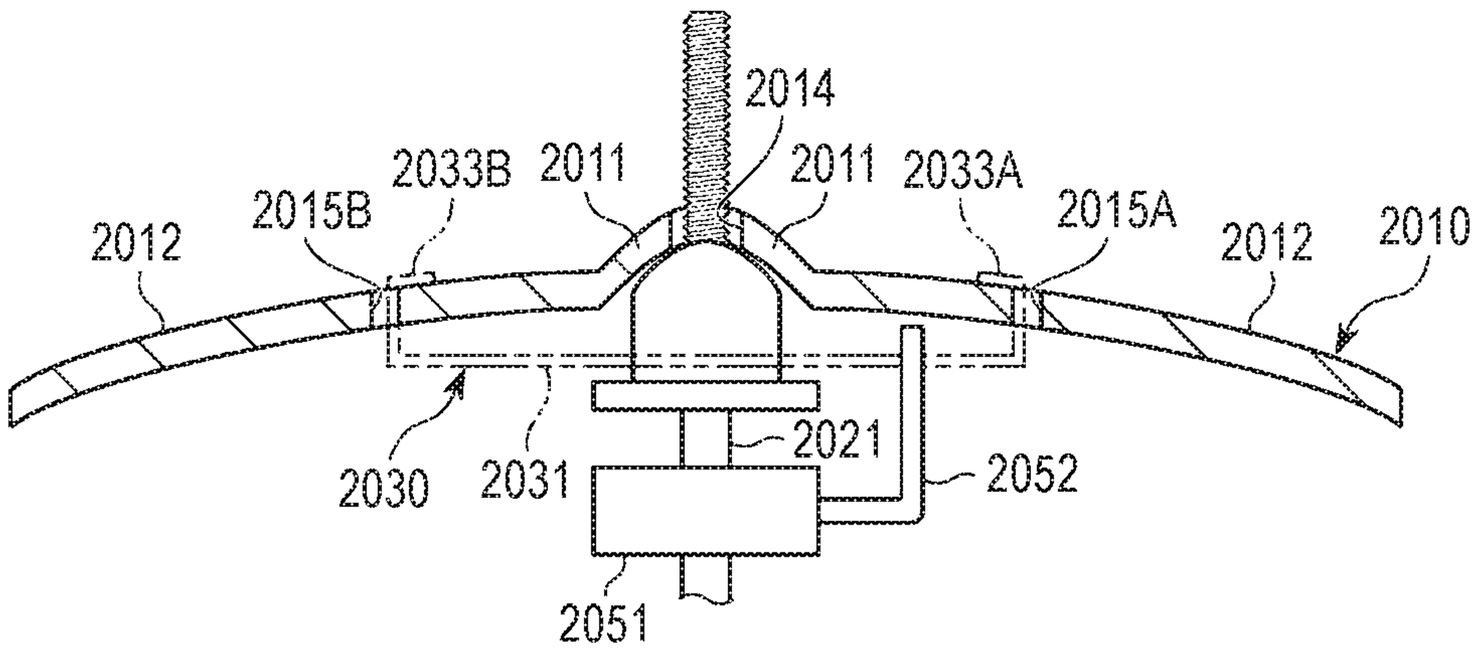


FIG. 12B

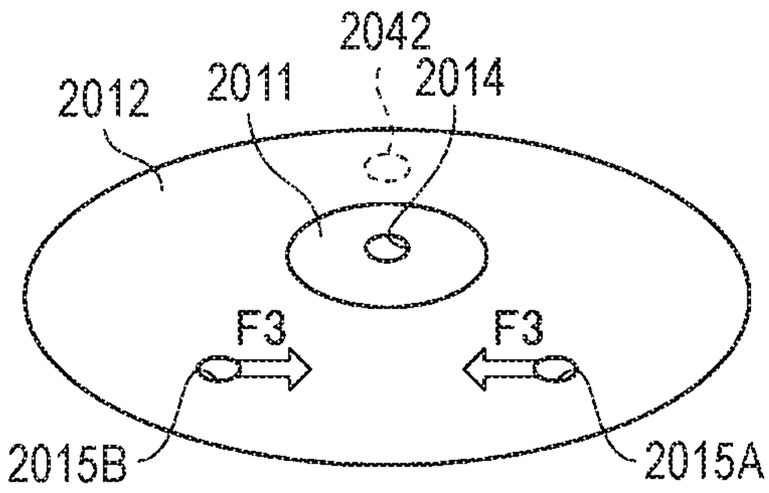


FIG. 12C

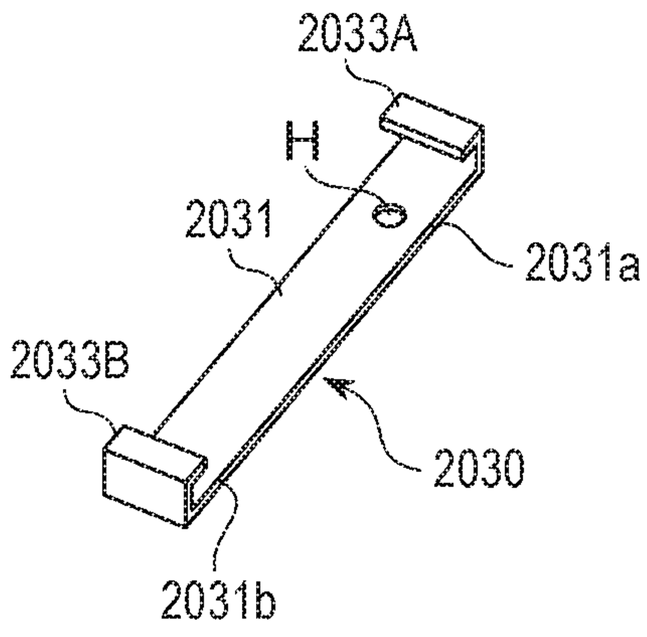


FIG. 12D

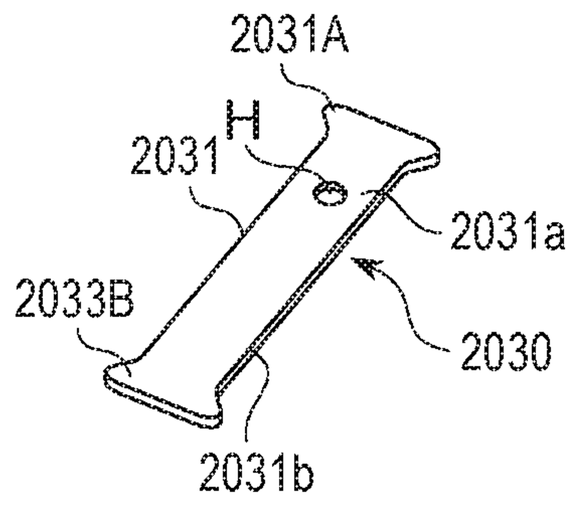


FIG. 13A

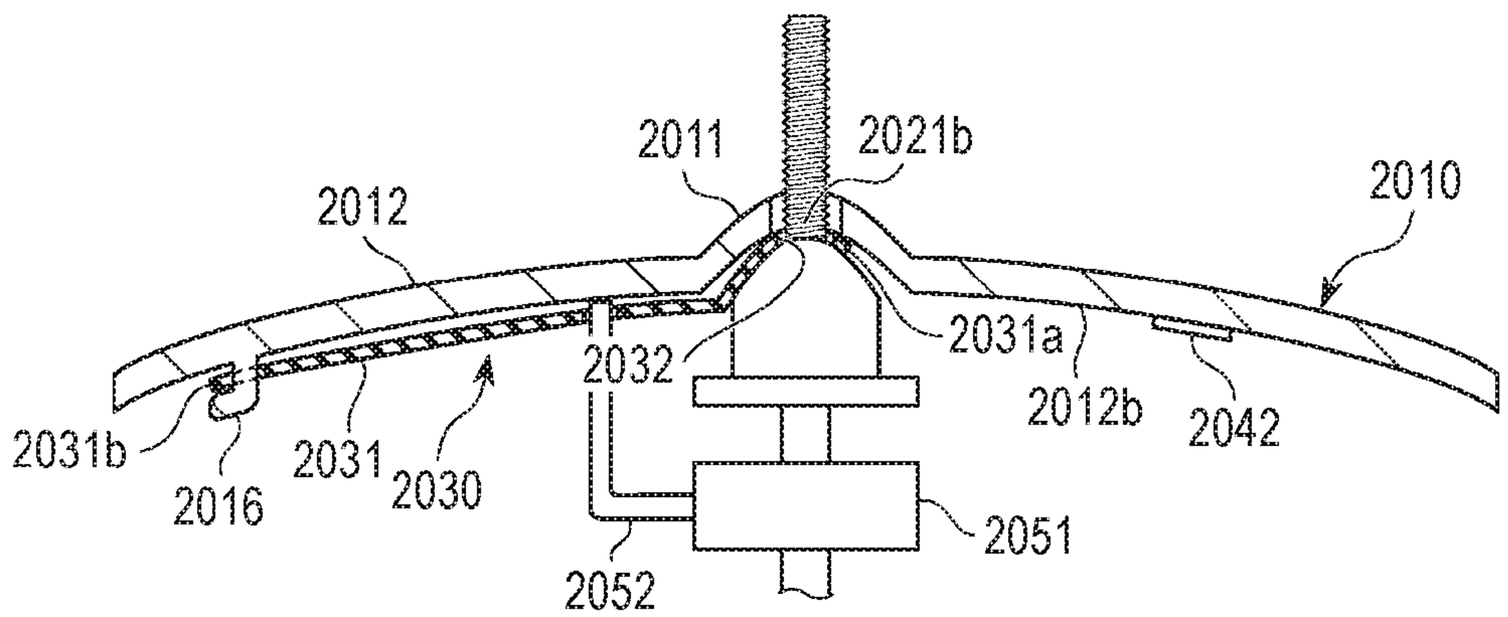


FIG. 13B

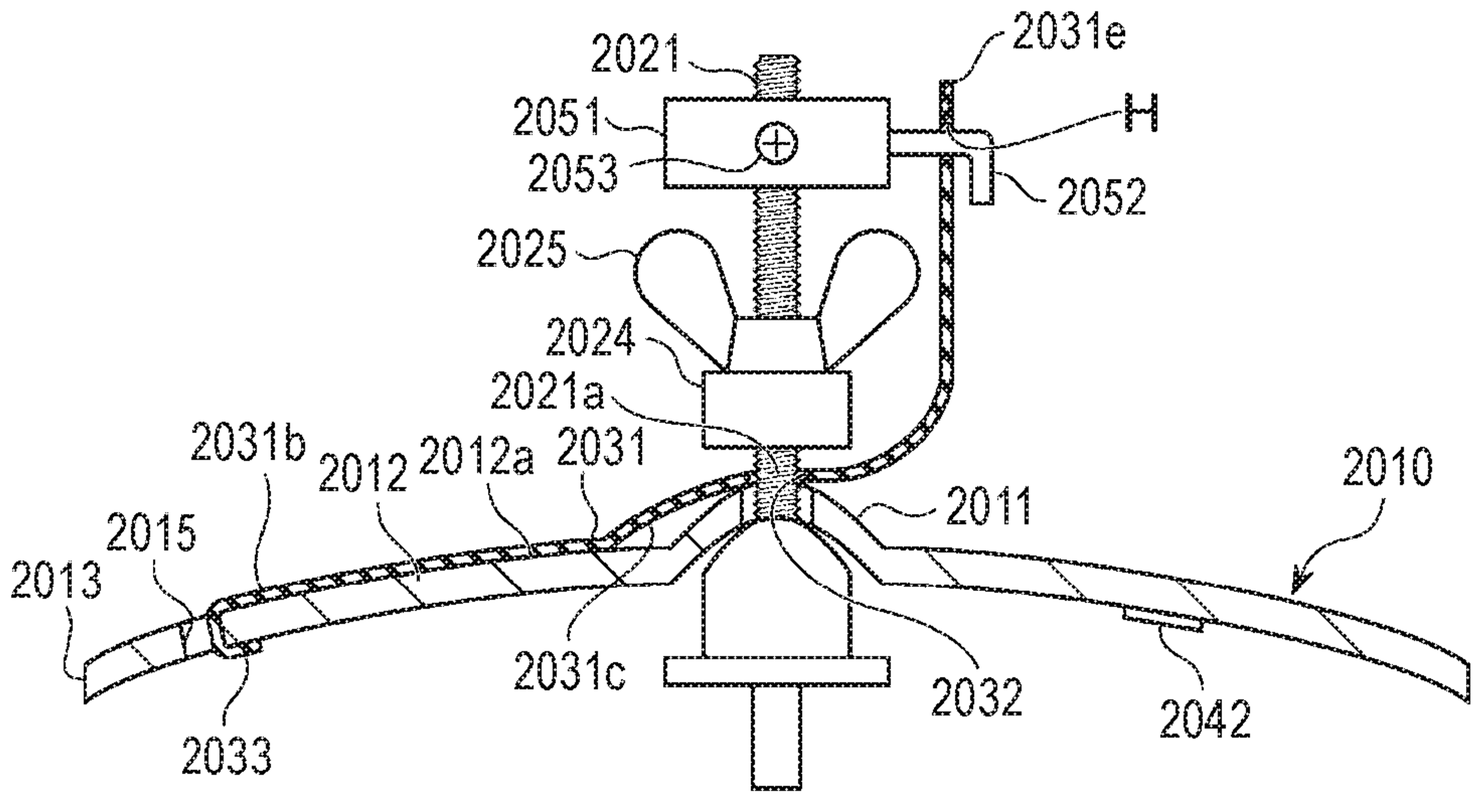


FIG. 13C

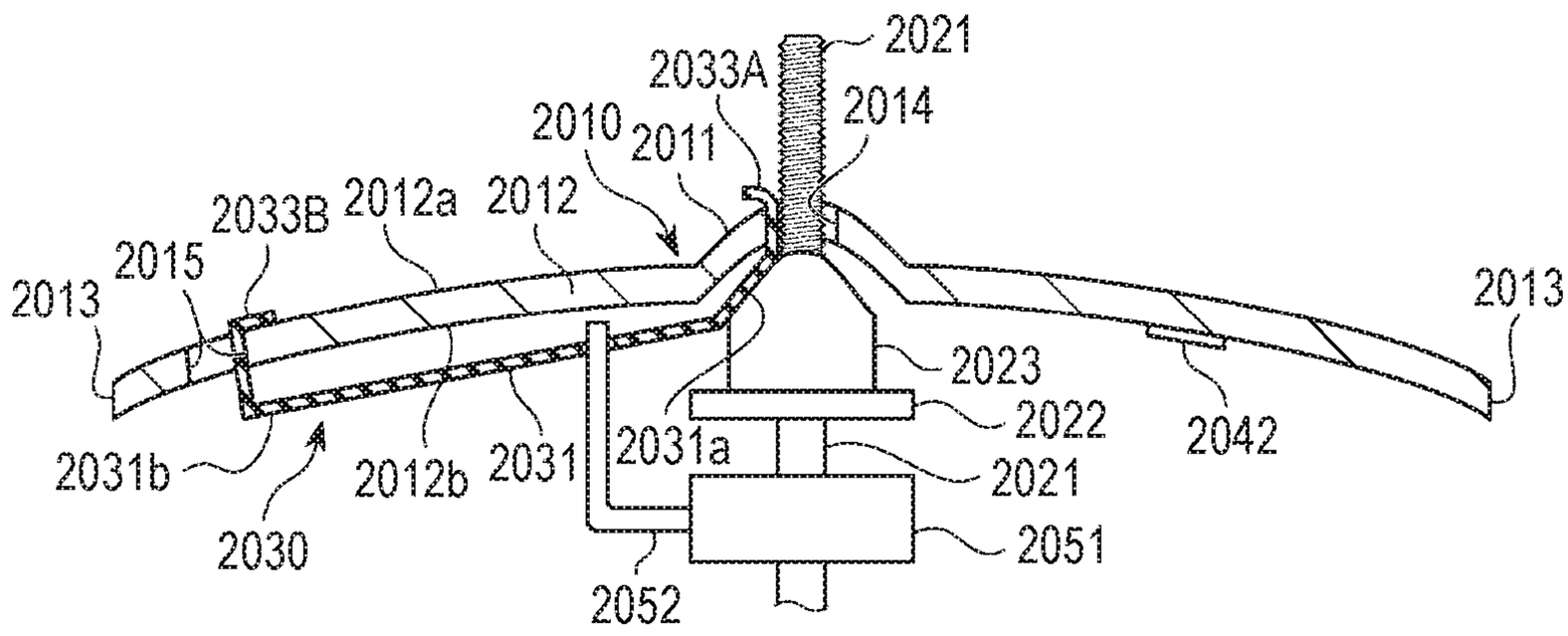


FIG. 14A

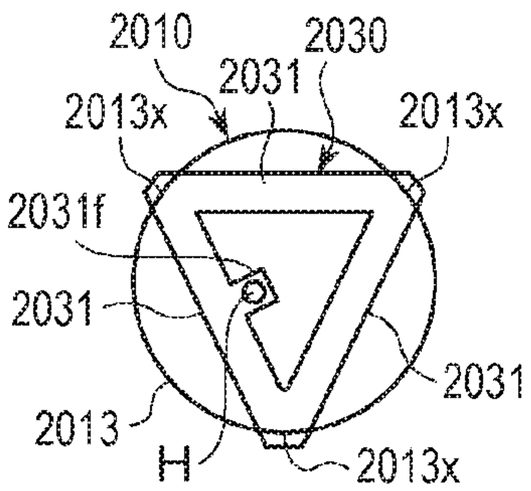


FIG. 14B

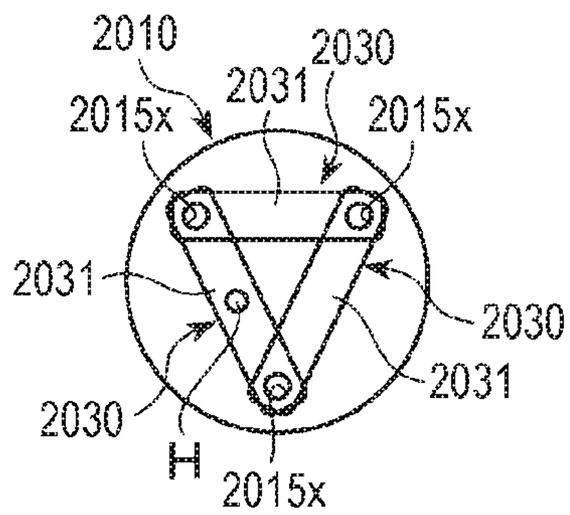


FIG. 14C

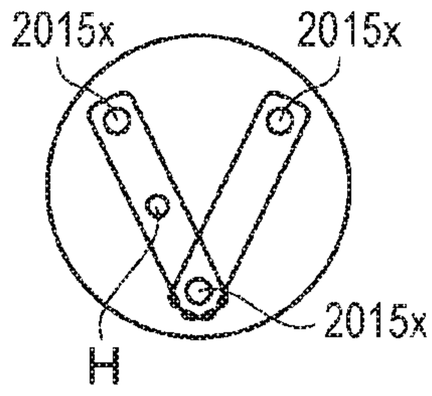


FIG. 14D

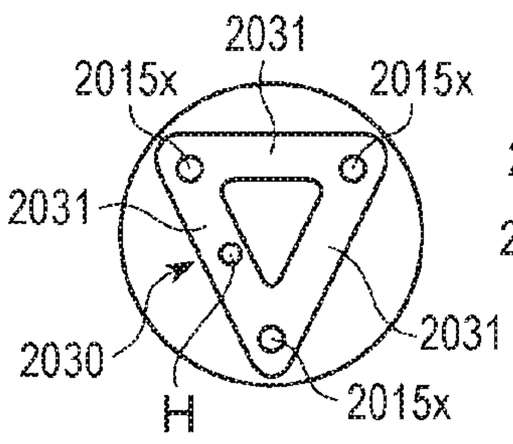


FIG. 14E

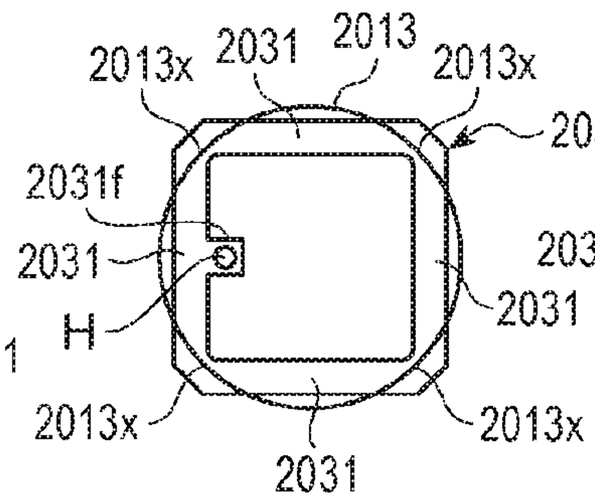


FIG. 14F

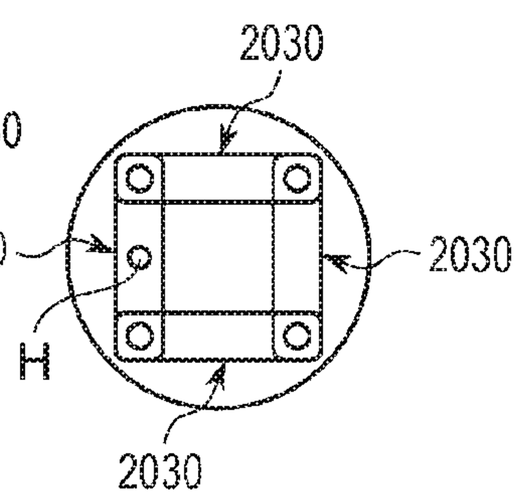


FIG. 14G

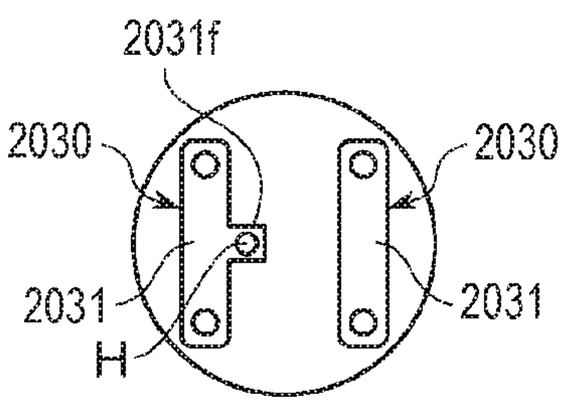


FIG. 14H

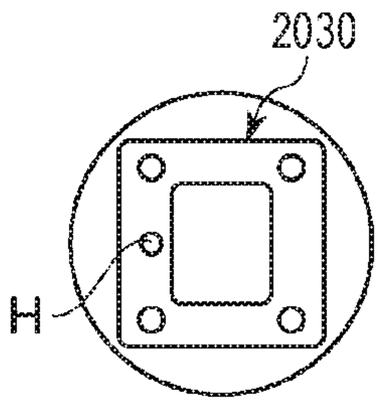


FIG. 14I

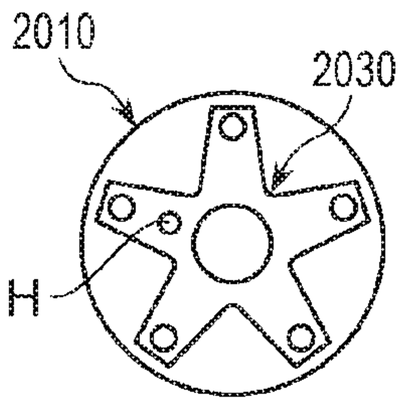


FIG. 14J

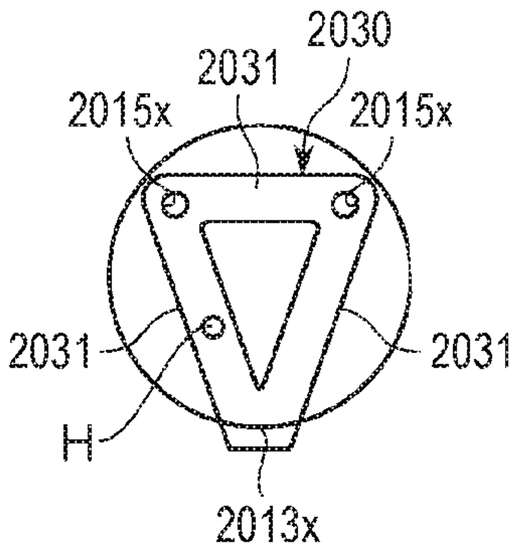


FIG. 14K

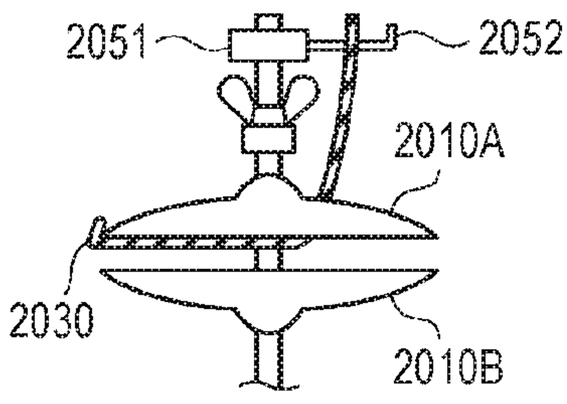


FIG. 15A

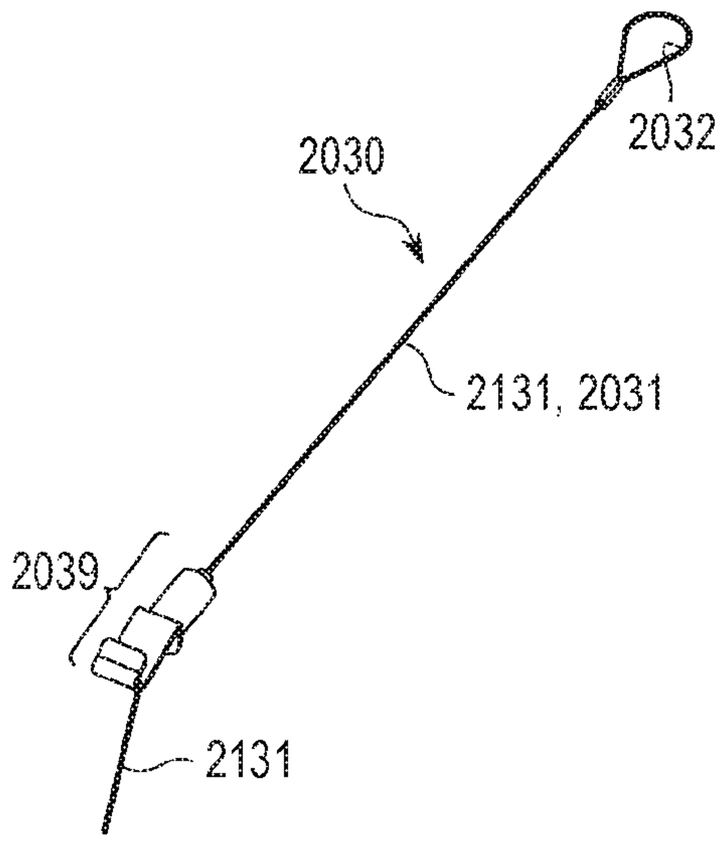


FIG. 15B

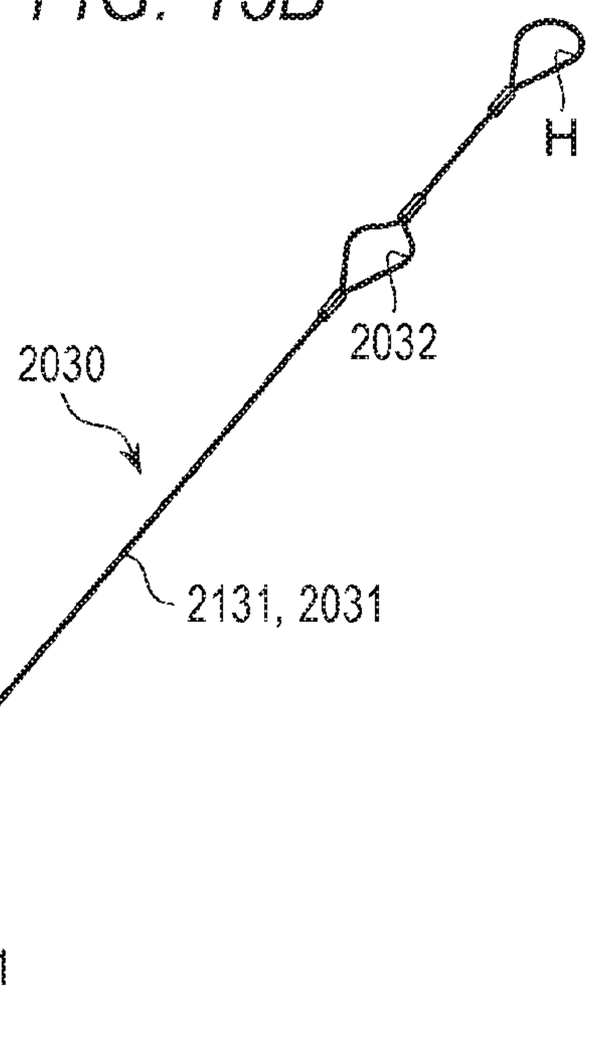


FIG. 15C

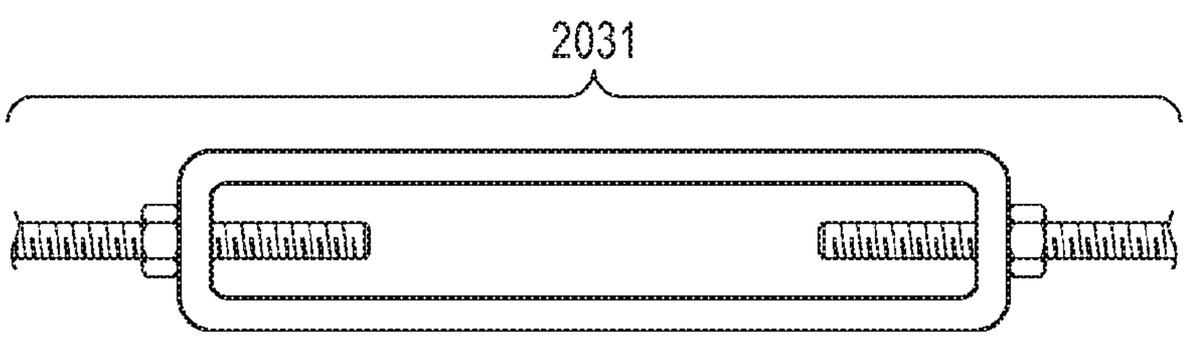


FIG. 15D

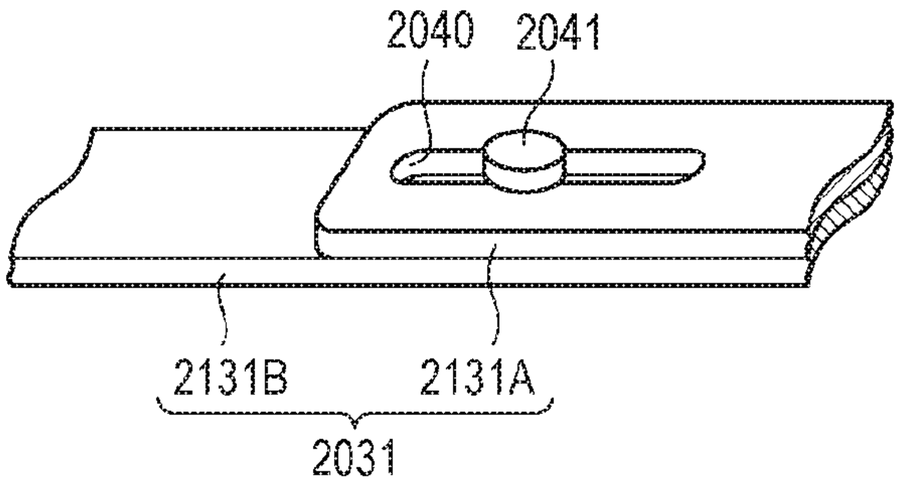


FIG. 15E

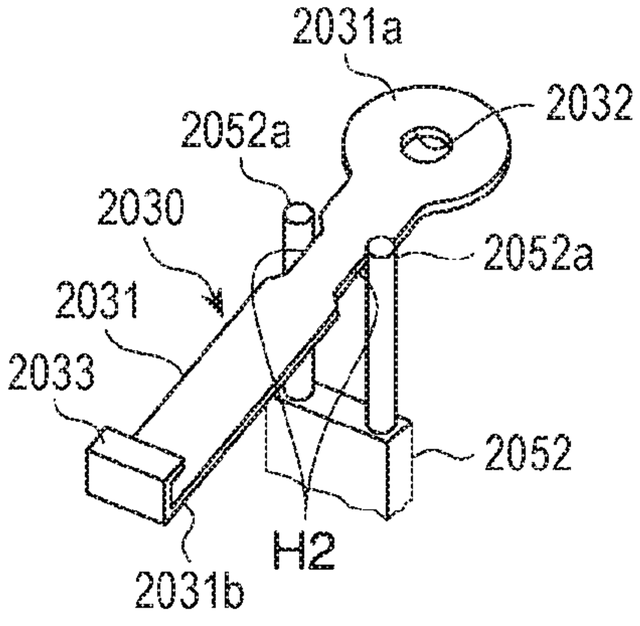


FIG. 16A

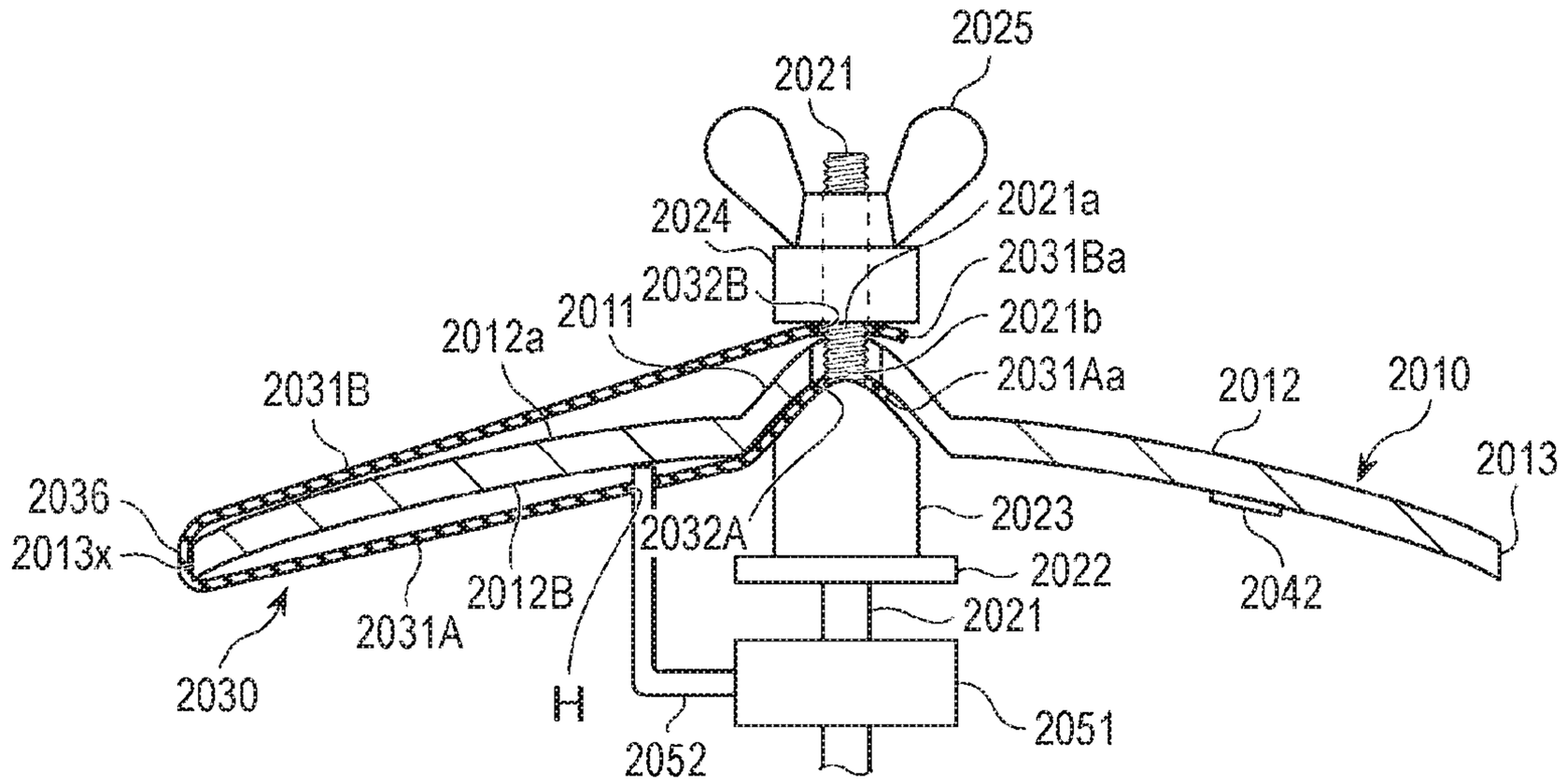
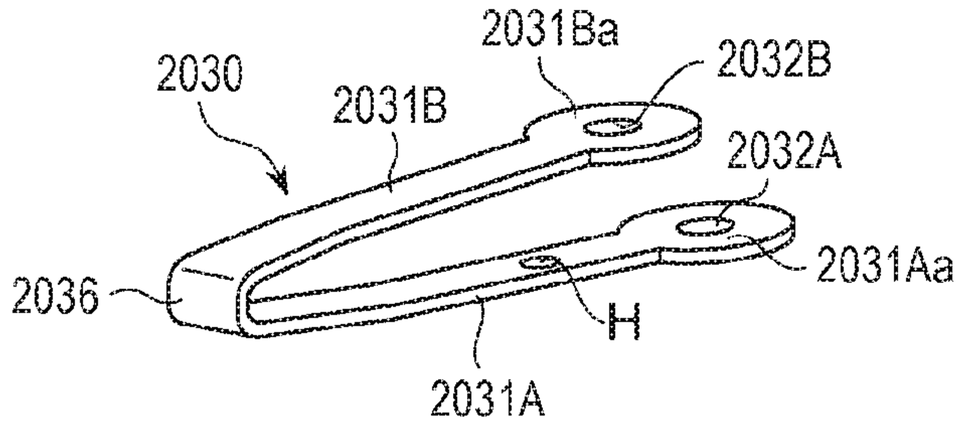


FIG. 16B



MOUNTING DEVICE FOR CYMBAL TYPE PERCUSSION INSTRUMENT

CROSS-REFERENCE TO RELATED APPLICATION(S)

This application is based upon and claims the benefit of priority from prior Japanese patent application No. 2015-009526, filed on Jan. 21, 2015 and Japanese patent application No. 2015-147551, filed on Jul. 27, 2015, the entire contents of which are incorporated herein by reference.

BACKGROUND

The present invention relates to a mounting device a cymbal type percussion instrument.

According to the background art, there is a damping device for a cymbal, which can reduce hitting sound occurring when an acoustic cymbal made of metal is hit. For example, in the following Patent Literatures 1 through 3, there has been used a configuration in which a damping piece is mounted on a cymbal. That is, in the following Patent Literature 1, an elastic sheet is attached to a cymbal in a region ranging from an upper surface of the cymbal to an edge of the cymbal and the portion of the elastic sheet is hit during performance so that hitting sound can be reduced. In the following Patent Literature 2, a ring-like silencing piece which can expand and compress is attached to the whole of a circumferential edge portion of a cymbal so that sound can be silenced. In the following Patent Literature 3, a frame is attached to a back side of a cymbal to press an elastic member against a bow portion so that hitting sound can be reduced. In addition thereto, a performer may paste tape to the cymbal or hold the circumferential edge portion with a clip etc.

On the other hand, in the following Patent Literature 4, there has been used a configuration in which a large number of small holes are formed in a metal plate constituting a cymbal to absorb hitting energy so that sound can be silenced.

The following configuration has been used in the following non-Patent Literature 1. That is, a large number of small holes are formed in a metal plate constituting the cymbal to absorb hitting energy so that sound can be silenced. In addition, a sensor for detecting hitting is provided in the cymbal so that it is possible to add electronic music.

In the background art, no special difference will appear in an acoustic cymbal even if the cymbal is hit at any circumferential position. Accordingly, the cymbal is normally not restricted from rotating relatively to a stand.

[Patent Literature 1] JP-UM-A-52-24918
[Patent Literature 2] JP-A-8-272359
[Patent Literature 3] JP-A-2014-66832
[Patent Literature 4] JP-A-11-184459
[Non-Patent Literature] "Ikebe New Product Press", [online], The next generation of "noise dampers" cymbals from Zildjian, GEN16 BUFFED BRONZE appeared!, (Retrieved on Jun. 19, 2015), Internet <URL:http://www.ikebe-gakki-pb.com/new_product/?p=3286>

However, as disclosed in Patent Literatures 1 through 3, when an excessively soft foreign body is placed as the damping piece on the cymbal in the configuration in which the damping piece is mounted on the cymbal, feeling of hitting largely differs from that of an ordinary acoustic cymbal. In addition, bouncing back after hitting becomes so weak that it is difficult to make a roll. Further, the degree of surface friction changes so that it is difficult to use a technique of performing sliding on the surface of the cymbal.

In addition, in the configuration in which the entire region of the damping piece facing a bow portion of the cymbal touches the bow portion, vibration of the bow portion is suppressed in a wide area. Accordingly, hitting sound changes largely from original sound of the cymbal. Particularly when a soft damping piece is placed on the cymbal, sound rich in a high frequency is attenuated excessively. Hitting sound turns to sound mainly containing low-frequency components as if rubber or sponge were hit. Further, when the cymbal has a configuration in which the cymbal is largely covered with the damping piece from above, external appearance of the cymbal changes largely.

In addition, in the configuration disclosed in Patent Literature 4, unique shape characteristics as the small holes have to be provided in the cymbal per se. For the reason, the cymbal cannot be used widely. In addition, also in any of the configurations according to the background art, the degree of damping cannot be adjusted easily by a performer.

According to the cymbal disclosed in non-Patent Literature 1, when the cymbal rotates, the hitting position changes. Therefore, there is a fear that detection accuracy may be unstable due to the relation between the hitting position and the sensor position as described above. It may be considered that the small holes formed in the cymbal are used so that rotation of the cymbal can be restricted by some member. However, such a small hole is absent from a widely used acoustic cymbal. It is therefore unrealistic to perform additional treatment etc. on the cymbal to form a lock portion such as a small hole in the cymbal for restricting rotation of the cymbal.

In the case in which at least apart of the mounting member such as the damping piece is exposed on an upper side of the cymbal, it is necessary to hit the cymbal while keeping away from the mounting member. Thus, in some arrangement of the mounting member, when the cymbal rotates, the position of the mounting member may change to make it difficult to perform the cymbal.

SUMMARY

It is an object of the invention to provide a mounting device for a cymbal type percussion instrument, which can reduce volume without excessively affecting hitting sound and in which a rotation range of an acoustic cymbal can be restricted without applying special treatment to the acoustic cymbal.

In order to achieve the object, according to the invention, there is provided a mounting device for a cymbal type percussion instrument, the cymbal type percussion instrument including at least one cymbal supported on a support, the mounting device comprising: a mounting member which is mounted in at least two different positions on the cymbal type percussion instrument, the mounting member which is configured to suppress motion of the cymbal when the mounting member is mounted in the at least two different positions on the cymbal type percussion instrument so as to hold a position of the mounting member relative to the cymbal.

The cymbal may include a cup portion and a bow portion, an insertion hole formed in the cup portion, a rod which is a part of the support inserted into the insertion hole to support the cup portion on the support, the bow portion coupled to the cup portion and having an edge portion as an outer circumferential edge, and the mounting member may

include a connection portion which connects a first engagement portion and a second engagement portion to each other, the first engagement portion being one of the insertion hole, the support and a portion fixed to the support, the second engagement portion being one of the edge portion of the bow portion and an engagement function portion provided in a position closer to the edge portion than the cup portion in the bow portion.

There is also provided a damping device which is the mounting device, and which is configured to reduce hitting sound of the cymbal by suppressing vibrating motion of the cymbal when the cymbal is hit, wherein when the first engagement portion and the second engagement portion are connected to each other, the connection portion urges the first engagement portion and the second engagement portion in a direction to approach each other, and at least a part of the connection portion, which faces the bow portion, is brought into a non-abutment state with the bow portion.

The first engagement portion may include an upper engagement portion which can be engaged from an upper side of the cup portion and a lower engagement portion which can be engaged from a lower side of the cup portion, the second engagement portion may be the edge portion, and one end portion of the connection portion may be engaged with the lower engagement portion from the lower side of the cup portion, while the connection portion may be put around the edge portion to engage the other end portion of the connection portion with the upper engagement portion from the upper side of the cup portion, so that a portion of the edge portion around which the connection portion is put is urged in a direction toward a position of the insertion hole.

There is also provided a damping device which is the mounting device, and which is configured to reduce hitting sound of the cymbal, wherein the connection portion brings each of engagement portions into a connection relation to at least one of the other engagement portions, the engagement portions including an arbitrary circumferential place of the edge portion and an engagement function portion provided in a position closer to the edge portion than the cup portion, and when the connection portion brings each of engagement portions into the connection relation with the at least one of the other engagement portions, the connection portion urges the engagement portions in the connection relation in a direction to approach each other, and at least a part of the connection portion, which faces the bow portion, is brought into a non-abutment state with the bow portion.

The connection portion may be constituted by an elastic member and exerts an urging force due to its elasticity.

The connection portion may include an adjustment mechanism which adjusts a length of the connection portion.

There is also provided a cymbal type percussion instrument which includes the mounting device, the cymbal which is an acoustic cymbal which is hit to make vibration to thereby produce sound as performance sound, the cymbal type percussion instrument comprising: a sensor which is attached to the acoustic cymbal and which is configured to detect the vibration of the acoustic cymbal; a fixation portion which is fixed to the support; and a restriction portion which is a part of the fixation portion or fixed to the fixation portion, and which is engaged with the mounting member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating, wherein the mounting device is configured to suppress rotating motion of the acoustic cymbal when the acoustic cymbal is hit.

The mounting member may be a damping member which is configured to reduce hitting sound of the acoustic cymbal.

There is also provided a cymbal type percussion instrument which includes the mounding device, wherein the cymbal is an acoustic cymbal, the mounting member is a damping member which is mounted on the acoustic cymbal so that at least a part of the damping member is exposed on an upper side from the acoustic cymbal and which is configured to reduce hitting sound of the acoustic cymbal, the cymbal type percussion instrument includes a fixation portion which is fixed to the support, and a restriction portion which is a part of the fixation portion or fixed to the fixation portion and which is engaged with the damping member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating, and when the connection portion connects the first engagement portion and the second engagement portion to each other, the connection portion urges the first engagement portion and the second engagement portion in a direction to approach each other, and at least a part of the connection portion, which faces the bow portion, is brought into a non-abutment state with the bow portion.

The first engagement portion may include an upper engagement portion which can be engaged from an upper side of the cup portion and a lower engagement portion which can be engaged from a lower side of the cup portion, the second engagement portion may be the edge portion, and one end portion of the connection portion may be engaged with the lower engagement portion from the lower side of the cup portion, while the connection portion may be put around the edge portion to engage the other end portion of the connection portion with the upper engagement portion from the upper side of the cup portion, so that a portion of the edge portion around which the connection portion is put is urged in a direction toward a position of the insertion hole.

There is also provided a cymbal type percussion instrument which includes the mounding device, wherein the cymbal is an acoustic cymbal, the mounting member is a damping member which is mounted on the acoustic cymbal so that at least a part of the damping member is exposed on an upper side from the acoustic cymbal and which is configured to reduce hitting sound of the acoustic cymbal, the cymbal type percussion instrument includes a fixation portion which is fixed to the support, and a restriction portion which is a part of the fixation portion or fixed to the fixation portion and which is engaged with the damping member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating, the connection portion brings each of engagement portions into a connection relation with at least one of the other engagement portions, the engagement portions including an arbitrary circumferential place of the edge portion and an engagement function portion provided in a position closer to the edge portion than the cup portion, and when the connection portion brings each of engagement portions into the connection relation with the at least one of the other engagement portions, the connection portion urges the engagement portions in the connection relation in a direction to approach each other, and at least a part of the connection portion, which faces the bow portion, is brought into a non-abutment state with the bow portion.

The cymbal type percussion instrument may further comprise: a sensor which is attached to the acoustic cymbal and which is configured to detect vibration of the acoustic cymbal.

There is also provided a cymbal rotation restricting device which is the mounting device, the cymbal which is an acoustic cymbal, the cymbal rotation restricting device comprising: a restriction portion which is a part of a fixation

portion fixed to the support or fixed to the fixation portion, and which is engaged with the mounting member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a schematic sectional view of a cymbal to which a damping device according to a first embodiment is applied, FIG. **1**B is a schematic perspective view of the cymbal which is seen obliquely from top, and FIGS. **1**C to **1**E are perspective views of damping pieces.

FIG. **2** is a graph showing temporal change in volume of hitting sound due to mounting with/without a damping piece.

FIG. **3**A is a schematic sectional view of a cymbal to which a damping piece according to a second embodiment is applied and FIG. **3**B is a schematic perspective view of the cymbal which is seen obliquely from top.

FIG. **4**A is a schematic sectional view of a cymbal to which a damping piece according to a third embodiment is applied, FIG. **4**B is a schematic perspective view of the cymbal which is seen obliquely from top, and FIGS. **4**C and **4**D are perspective views of cymbals.

FIGS. **5**A to **5**C are schematic views showing cymbals to which damping pieces according to modifications are applied respectively.

FIGS. **6**A to **6**L are schematic bottom views of cymbals mounted with damping pieces according to modifications.

FIGS. **7**A to **7**C are views showing examples of an adjustment mechanism for adjusting a length of a connection portion.

FIG. **8**A is a schematic sectional view of a cymbal to which a damping piece according to a fourth embodiment is applied, and FIG. **8**B is a perspective view of the damping piece.

FIG. **9**A is a schematic sectional view of a cymbal type percussion instrument according to a fifth embodiment, FIG. **9**B is a schematic perspective view of a cymbal seen obliquely from top, and FIGS. **9**C, **9**D and **9**E are perspective views of damping pieces.

FIG. **10** is a graph showing temporal change in volume of hitting sound due to mounting with/without a damping piece.

FIG. **11**A is a schematic sectional view of a cymbal type percussion instrument according to a sixth embodiment, FIG. **11**B is a schematic perspective view of a cymbal seen obliquely from top, and FIG. **11**C is a perspective view of a damping piece.

FIG. **12**A is a schematic sectional view of a cymbal type percussion instrument according to a seventh embodiment, FIG. **12**B is a schematic perspective view of a cymbal seen obliquely from top, and FIGS. **12**C and **12**D are perspective views of damping pieces.

FIGS. **13**A to **13**C are schematic views of cymbals to which damping pieces according to modifications are applied.

FIGS. **14**A to **14**K are schematic bottom views of cymbals mounted with damping pieces according to modifications.

FIG. **15**A to **15**D are views showing examples of an adjustment mechanism for adjusting a length of a connection portion, and FIG. **15**E is a perspective view showing combination of a damping piece and a restriction portion according to a modification.

FIG. **16**A is a schematic sectional view of a cymbal type percussion instrument according to an eighth embodiment and FIG. **16**B is a perspective view of a damping piece.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

A cymbal makes complicated and large motion by a hitting operation or a pedal opening/closing operation of a performer. The motion includes, for example, vibration in a circumferential direction of the cymbal, vibration from an end of the cymbal which is hit to an opposite end of the cymbal, rotation about a central axis of the cymbal, or swing about the central axis of the cymbal. Due to the motion of the cymbal, sound is generated. In the invention, the motion of the cymbal which is made when hitting can be suppressed. In some embodiments, by suppressing the vibration of the cymbal, volume of the generated sound can be reduced without affecting the sound. In the other embodiments, by suppressing the rotation of the cymbal, detection accuracy of hitting can be increased.

Embodiments of the invention will be described below with reference to the drawings.

First Embodiment

FIG. **1**A is a schematic sectional view of a cymbal to which a damping device according to a first embodiment of the present invention is applied. FIG. **1**B is a schematic perspective view of the cymbal which is seen obliquely from top (front). The cymbal **1010** is an acoustic percussion instrument which is mainly made of metal and which is hit and performed by a performer. The cymbal **1010** has a cup portion **1011**, and a bow portion **1012** which is coupled to the cup portion **1011**. The cup portion **1011** and the bow portion **1012** are formed integrally into a disk shape. The cup portion **1011** bulges slightly upward in a bowl shape from the bow portion **1012**. An insertion hole **1014** is formed in the center of the cup portion **1011**. An outer circumferential edge of the bow portion **1012** serves as an edge portion **1013**. When being placed horizontally, the bow portion **1012** is curved gently so as to be inclined downward as it goes toward an outer side in a radial direction. The bow portion **1012** has a front face **1012***a* and a back face **1012***b*. The front face **1012***a* becomes a face which is mainly hit. In addition thereto, the edge portion **1013** or the cup portion **1011** can be also a subject to be hit.

The cymbal **1010** is supported by a stand **1100** (FIG. **1**B) serving as a support having a rod **1021**. First, the cup portion **1011** and a connection portion **1031** of a damping piece **1030** are interposed between an upper buffer material **1024** and a lower buffer material **1023**. The lower buffer material **1023** is disposed on a pedestal **1022**. The rod **1021** is inserted into the insertion hole **1014** of the cup portion **1011** from below and fastened by a clamp **1025** through the buffer material **1024**. The clamp **1025** serves as a wing nut. Thus, the cymbal **1010** is supported on the rod **1021**. The rod **1021** is fitted to the insertion hole **1014** loosely. The cymbal **1010** can swing and rotate with respect to the rod **1021** to some degree. Incidentally, the buffer material **1023** may be shaped like a cylinder.

As the damping device for reducing hitting sound of the cymbal **1010**, the damping piece **1030** is mounted on the cymbal **1010**. FIG. **1**C is a perspective view of the damping piece **1030**. In FIG. **1**A, the damping piece **1030** is drawn to be thick in thickness with exaggeration. The damping piece **1030** has the connection portion **1031** which is formed

integrally as an elastic member such as rubber, an electric resin or a spring. Incidentally, any other portion than the connection portion **1031** in the damping piece **1030** may be constituted by a harder member than the connection portion **1031**. An attachment hole **1032** is formed in one end portion **1031***a* of the connection portion **1031** in a longitudinal direction, and a hook-like attachment portion **1033** is formed in the other end portion **1031***b* of the connection portion **1031**. The attachment hole **1032** has a size large enough to be penetrated by the rod **1021**.

An engagement hole **1015** is formed in the bow portion **1012** (FIGS. **1**A and **1**B). The engagement hole **1015** is an engagement function portion which is provided in a position closer to the edge portion **1013** than the cup portion **1011** in the radial direction. In the embodiment, the engagement hole **1015** is an example of a "second engagement portion".

The damping piece **1030** connects a portion **1021***b* of the rod **1021** and the engagement hole **1015** to each other. The portion **1021***b* is interposed between the cup portion **1011** and the buffer material **1023**. In the embodiment, particularly the portion **1021***b* of the rod **1021** is an example of a "first engagement portion". That is, in order to support the cymbal **1010** on the rod **1021**, the rod **1021** is inserted into the attachment hole **1032** of the damping piece **1030** so that the one end portion **1031***a* of the damping piece **1030** can be interposed between the cup portion **1011** and the buffer material **1023**, and the cup portion **1011** and the one end portion **1031***a* of the damping piece **1030** are fastened by the clamp **1025** through the buffer material **1024**. Further, the attachment portion **1033** of the other end portion **1031***b* of the damping piece **1030** is inserted into the engagement hole **1015** from below so as to be engaged therewith.

A length of the connection portion **1031** (a length between the attachment hole **1032** and the attachment portion **1033**) in a free state is set to be slightly shorter than a distance between the portion **1021***b* and the engagement hole **1015**. Accordingly, when the attachment hole **1032** is engaged with the portion **1021***b* and the attachment portion **1033** is engaged with the engagement hole **1015**, the connection portion **1031** is brought into a tensile state. Due to elasticity of the connection portion **1031**, the connection portion **1031** urges the portion **1021***b* and the engagement hole **1015** in a direction to approach each other. The portion **1021***b* is one part of the rod **1021** fixed to the stand **1100**. Accordingly, an urging force F**1** toward the radial center of the cymbal **1010** where the insertion hole **1014** is located acts on the engagement hole **1015** relatively (FIG. **1**B). As a result, as the cymbal **1010**, the insertion hole **1014** and the engagement hole **1015** are urged in a direction to approach each other.

The connection portion **1031** is in a non-abutment state with the bow portion **1012** in at least a part of a region facing the back face **1012***b* of the bow portion **1012**. In the example of FIG. **1**A, the bow portion **1012** is curved to be convex upward. Accordingly, the connection portion **1031** is in a non-abutment state with the bow portion **1012** in almost the entire region.

FIG. **2** is a view showing temporal change in volume of hitting sound due to mounting with/without a damping piece. In FIG. **2**, the abscissa designates elapsed time (second) after hitting, and the ordinate designates volume (dB). When no damping piece is mounted, the volume does not decrease to 0 dB even after a lapse of about 1.0 second. On the other hand, when the damping piece according to the background art is mounted to mute sound substantially completely, the sound is completely attenuated before a lapse of about 0.2 seconds. On the contrary, when the damping piece **1030** according to the embodiment is mounted, the volume is attenuated to 0 dB after a lapse of about 0.5 seconds. Pay attention to the maximum level. The maximum level in the case where the damping piece **1030** according to the embodiment is mounted is suppressed to be lower than that in any of the case where no damping piece is mounted and the case where the damping piece according to the background art is mounted. That is, it is possible to suppress the volume to be lower while keeping a moderate attenuation time of sound.

According to analysis of the present applicant, it has been proved that such an effect can be obtained when the insertion hole **1014** and the engagement hole **1015** are urged in a direction to approach each other in the cymbal **1010**. In the embodiment which is different from the background-art configuration in which a soft damping piece is mounted on the cymbal, tension in a compression direction is applied to apart of the cymbal **1010** so that volume can be suppressed to be lower without excessively attenuating sound rich in a high frequency.

In addition, the connection portion **1031** of the damping piece **1030** has a region which belongs to the region facing the bow portion **1012** and which is in a non-abutment state with the bow portion **1012**. Accordingly, vibration of the bow portion can be prevented from being suppressed in a wide area as in a configuration in which the connection portion **1031** touches the bow portion in the entire region as described in the background art. Thus, hitting sound can be prevented from changing largely from original cymbal sound.

Accordingly, according to the embodiment, it is possible to reduce the volume without excessively affecting the hitting sound.

In addition, in the damping piece **1030**, the portion which is exposed on the front side of the cymbal **1010** is only the attachment portion **1033**. Accordingly, it is possible to secure a large region where the damping piece **1030** does not have to be hit directly, i.e. a large hitting area where feeling of hitting does not change, in comparison with the background-art configuration in which the cymbal is largely covered with the damping piece from above. Accordingly, it is possible to reduce the possibility that the feeling of hitting may be spoiled. In addition, it is also possible to prevent external appearance of the cymbal **1010** from changing largely. Moreover, the connection portion **1031** of the damping piece **1030** is constituted by an elastic member to exert an urging force due to its elasticity. Accordingly, it is possible to generate an urging force with a simple configuration.

Incidentally, the configuration of the portion attached to the cymbal **1010** in the damping piece **1030** is not limited to the illustrated one. Several modifications will be described later. For example, modifications shown in FIGS. **1**D and **1**E may be used in the embodiment. That is, the attachment portion **1033** of the damping piece **1030** may be not shaped like a hook but formed into a wide shape (FIG. **1**D). The wide attachment portion **1033** which is inserted into the engagement hole **1015** to be engaged therewith can also achieve the same function as that in FIG. **1**C. The damping piece **1030** may be not formed integrally but a metal fitting **1034** may be attached to the other end portion **1031***b* and a hook-like attachment portion **1033** may be formed in the metal fitting **1034** alternatively, as shown in FIG. **1**E. Incidentally, it may go well as long as at least a part (mainly the connection portion **1031**) of the damping piece **1030** has elasticity. Accordingly, configuration may be made in such a manner that a metal fitting etc. where the attachment hole **1032** is formed is also attached to the one end portion **1031***a*.

Incidentally, the number of the engagement holes **1015** formed in the cymbal **1010** is not necessarily one, but one of the small holes used in the aforementioned Patent Literature 4 may be used.

Second Embodiment

FIG. **3**A is a schematic sectional view of a cymbal to which a damping piece according to a second embodiment is applied. FIG. **3**B is a schematic perspective view of the cymbal which is seen obliquely from top. A buffer material **1024**, a clamp **1025**, etc. are not shown in FIGS. **3**A and **3**B.

The first embodiment has a configuration in which the attachment portion **1033** of the damping piece **1030** is engaged with the engagement hole **1015** formed in the cymbal **1010**. In contrast with this, the damping piece **1030** in the second embodiment is connected to an edge portion **1013** which is an outer circumferential edge of a bow portion **1012**.

In the embodiment, the damping piece **1030** connects a portion **1021***b* of a rod **1021** and an edge portion **1013***x* to each other. The edge portion **1013***x* is an arbitrary place in a circumferential direction in the edge portion **1013** which is the outer circumferential edge of the bow portion **1012**. The position of the edge portion **1013***x* is not limited. In the embodiment, the edge portion **1013***x* is an example of the "second engagement portion". The configuration of the damping piece **1030** is the same as that shown in FIG. **1**C. A length of the damping piece **1030** is set to be slightly shorter than a distance between the portion **1021***b* and the edge portion **1013***x*.

As shown in FIG. **3**A, the rod **1021** is inserted into an attachment hole **1032** in one end portion **1031***a* of the damping piece **1030**. This point is the same as that in the first embodiment. On the other hand, a hook-like attachment portion **1033** in the other end portion **1031***b* of the damping piece **1030** is hooked onto the edge portion **1013***x* from its lower outer circumferential side so as to be engaged therewith. When the attachment hole **1032** is engaged with the portion **1021***b* and the attachment portion **1033** is engaged with the edge portion **1013***x*, the connection portion **1031** is brought into a tensile state. Due to elasticity of the connection portion **1031**, the connection portion **1031** urges the portion **1021***b* and the edge portion **1013***x* in a direction to approach each other. As a result, the insertion hole **1014** and the edge portion **1013***x* are urged in the direction to approach each other so that an urging force F**2** toward the insertion hole **1014** can act on the edge portion **1013***x* (FIG. **3**B). In addition, in the same manner as in the first embodiment, the connection portion **1031** is brought into a non-abutment state with the bow portion **1012** in almost the entire region.

In the cymbal **1010**, the insertion hole **1014** and the edge portion **1013***x* are urged in a direction to approach each other. Accordingly, it is possible to obtain an effect that it is possible to suppress the volume to be lower while keeping a moderate attenuation time of sound, as described in FIG. **2**.

According to the embodiment, it is possible to obtain the same effect as that in the first embodiment in order to reduce volume without excessively affecting hitting sound. At the same time, the cymbal **1010** does not have to have any engagement hole **1015**. Accordingly, versatility of the damping piece **1030** is wide.

Third Embodiment

FIG. **4**A is a schematic sectional view of a cymbal to which a damping piece according to a third embodiment is applied. FIG. **4**B is a schematic perspective view of the cymbal which is seen obliquely from top. FIG. **4**C is a perspective view of a damping piece **1030**. A buffer material **1024**, a clamp **1025**, etc. are not shown in FIGS. **4**A and **4**B.

In the third embodiment, two engagement holes **1015**A and **1015**B formed in the cymbal **1010** are connected to each other through the damping piece **1030**. Both the engagement holes **1015**A and **1015**B are engagement function portions which are provided in positions closer to an edge portion **1013** than a cup portion **1011** in a radial direction. The damping piece **1030** shown in FIG. **4**C corresponds to a configuration in which the attachment portion **1033** in the damping piece **1030** configured as shown in FIG. **1**C is provided on each of opposite ends of a connection portion **1031**. That is, a hook-like attachment portion **1033**A is formed in one end portion **1031***a* of the connection portion **1031** in a longitudinal direction, and a hook-like attachment portion **1033**B is formed in the other end portion **1031***b* of the connection portion **1031**. A length of the connection portion **1031** (a length between the attachment portions **1033**A and **1033**B) is set to be slightly shorter than a distance between the engagement holes **1015**A and **1015**B.

Regardless of whether the cymbal **1010** has been supported on a rod **1021** or not, the attachment portion **1033**A in the one end portion **1031***a* of the damping piece **1030** can be inserted into the engagement hole **1015**A from below so as to be engaged therewith, and the attachment portion **1033**B in the other end portion **1031***b* can be inserted into the engagement hole **1015**B from below so as to be engaged therewith. In this manner, the connection portion **1031** is brought into a tensile state. Due to elasticity of the connection portion **1031**, the engagement holes **1015**A and **1015**B are urged in directions to approach each other. Urging forces F**3** toward each other can act on the engagement holes **1015**A and **1015**B (FIG. **4**B). Thus, the urging forces do not have to be directed toward the radial center of the cymbal **1010** in order to obtain a damping effect.

According to the embodiment, it is possible to obtain the same effect as in the first embodiment in order to reduce volume without excessively affecting hitting sound.

However, it is desirable that the engagement holes **1015**A and **1015**B as the subjects to be connected by the damping piece **1030** are provided in positions as close to the edge portion **1013** as possible. This is because a higher volume reduction effect can be obtained as a region which receives tension in a compression direction is closer to the edge portion **1013**. For the same reason, it is desirable that the engagement hole **1015** is close to the edge portion **1013** in the first embodiment, and the edge portion **1013***x* is set as the subject to be engaged in the second embodiment.

Incidentally, a modification shown in FIG. **4**D may be used as the damping piece **1030** in the embodiment. That is, the example shown in FIG. **1**D may be applied so that one or each of the attachment portions **1033**A and **1033**B of the damping piece **1030** can be not shaped like a hook but formed into a wide shape. Incidentally, the example shown in FIG. **1**E may be applied so that one or each of a metal fitting where the attachment portion **1033**A is formed and a metal fitting where the attachment portion **1033**B is formed can be provided.

The configuration in which one end of the damping piece **1030** is connected to the rod **1021** and another end of the damping piece **1030** is connected to the engagement hole **1015** or the edge portion **1013** of the cymbal **1010** has been described in the first or second embodiment. In addition, the configuration in which the engagement holes **1015** are connected to each other has been shown by way of example

in the third embodiment. However, the engagement portions as the subjects to be connected by the damping piece **1030** are not limited to the illustrated ones.

For example, in the first and second embodiments, when the first engagement portion as one of the subjects to be connected is regarded as the insertion hole **1014** of the cymbal **1010**, the stand **1100** or the portion (the rod **1021** etc.) fixed to the stand **1100**, the second engagement portion as the other of the subjects to be connected may be the edge portion **1013** per se or the engagement function portion provided in a position closer to the edge portion **1013** than the cup portion **1011** in the bow portion **1012**. When this is applied to the third embodiment, a plurality of engagement portions as the subjects to be connected may include the edge portion **1013** per se in the cymbal **1010** or the engagement function portions provided in positions closer to the edge portion **1013** than the cup portion **1011** in the bow portion **1012**. It will go well in such a configuration that each of the engagement portions is in a connection relation to at least one of the others of the engagement portions through the damping piece **1030**. Modifications satisfying these conditions will be described with reference to FIGS. **5**A to **5**C and FIGS. **6**A to **6**L.

FIGS. **5**A, **5**B and **5**C are schematic sectional views of cymbals to which damping pieces according to the modifications are applied. First, an example shown in FIG. **5**A can be mainly applied to the first embodiment so that a hook **1016** is formed on a back face **1012***b* of a bow portion **1012**. The position of the hook **1016** is the same as that of the engagement hole **1015** (FIG. **1**A). The hook **1016** is an example of the "second engagement portion". A rod **1021** is inserted into an attachment hole **1032** in one end portion **1031***a* of the damping piece **1030** to be engaged therewith. This point is the same as that in the first embodiment. On the other hand, the same attachment hole as the attachment hole **1032** is provided in the other end portion **1031***b* of the damping piece **1030** to be engaged with the hook **1016**.

An example shown in FIG. **5**B can be mainly applied to the first embodiment, but the damping piece **1030** is disposed on not a back side but a front side of a cymbal **1010**. The configuration shown in FIG. **1**C can be fundamentally used as the configuration of the damping piece **1030**. A curved portion **1031***c* convex upward is formed in a connection portion **1031** of the damping piece **1030**. An attachment hole **1032** in one end portion **1031***a* of the damping piece **1030** is engaged with a portion **1021***a* of the rod **1021** on an upper side of a cup portion **1011**. The portion **1021***a* is an example of the "first engagement portion". An attachment portion **1033** in the other end portion **1031***b* of the damping piece **1030** is inserted into the engagement hole **1015** from above so as to be engaged therewith. The curved portion **1031***c* is in a non-abutment state with a front face **1012***a* of a bow portion **1012**.

Incidentally, the connection portion **1031** in at least a part of a region facing the bow portion **1012** has a shape which is not limited to the shape like the curved portion **1031***c* but may be any shape as long as it can be in a non-abutment state with the bow portion **1012**. In addition, the shape like the curved portion **1031***c* may be provided in the middle of the connection portion **1031** in a radial direction of the cymbal **1010**.

An example shown in FIG. **5**C can be mainly applied to the first embodiment. The damping piece **1030** preferably has the configuration shown in FIG. **4**C. Before the cymbal **1010** is supported on the rod **1021**, an attachment portion **1033**A in one end portion **1031***a* of the damping piece **1030** is inserted into an insertion hole **1014** from below so as to be engaged therewith and an attachment portion **1033**B in the other end portion **1031***b* of the damping piece **1030** is inserted into an engagement hole **1015** from below so as to be engaged therewith. The attachment portion **1033**A is an example of the "first engagement portion" and the engagement hole **1015** is an example of the "second engagement portion".

Incidentally, in the example of FIG. **5**B or **5**C, the attachment portion **1033** or the engagement portion **1033**B may be hooked on the edge portion **1013** so as to be engaged therewith as in the example of FIG. **3**A. In these cases, the edge portion **1013** serves as the "second engagement portion". In addition, in the example shown in FIG. **4**A, the damping piece **1030** may be disposed on the front side of the cymbal **1010**.

FIGS. **6**A to **6**L are schematic views of cymbals **1010** mounted with damping pieces **1030** according to modifications. In FIGS. **6**A to **6**L, each white circle corresponds to an engagement hole **1015** (FIG. **1**A etc.) provided in the cymbal **1010**. However, the white circle may designate a hook **1016** (FIG. **5**A) alternatively. Of an edge portion **1013**, an edge portion **1013***x* is a place with which the damping piece **1030** is engaged. As the shape of a portion of the damping piece **1030** engaged with each engagement portion, a hook shape, a hole, etc. may be used suitably in accordance with the shape of the engagement portion.

The number of the engagement portions as subjects to be connected by the damping piece **1030** or the damping pieces **1030** may be three (FIGS. **6**A to **6**D and **6**J), four (FIGS. **6**E to **6**H) or five (FIG. **6**I), or may be six or more. In addition, configuration may be made so that all three or more engagement portions can be connected by the damping piece **1030** alone (FIGS. **6**A, **6**D, **6**E, **6**H, **6**I and **6**J). Alternatively, two or more damping pieces **1030** which connect ones of the engagement portions to each other may be provided (FIGS. **6**B, **6**C, **6**F and **6**G).

In addition, as shown in FIG. **6**K, configuration in which urging forces can be exerted may be provided in a stand **1100**. In this case, the damping piece **1030** constitutes a part of the stand **1100**. First, an arm portion **1037** and an arm portion **1038** are provided in the stand **1100** and an interval between front ends of the arm portion **1037** and the arm portion **1038** in a free state is set to be shorter than a distance between two engagement holes **1015***x* provided in the cymbal **1010**. The arm portion **1037** and the arm portion **1038** are engaged with the engagement holes **1015***x* respectively. Thus, urging forces F**4** are applied between the two engagement holes **1015***x* in directions to approach each other. In this case, configuration may be made in such a manner that the arm portion **1037** and the arm portion **1038** can expand/compress or move desirably with respect to a stand body in order to allow the cymbal **1010** to swing.

Incidentally, although the damping piece **1030** or the damping pieces **1030** are disposed on the back side of the cymbal **1010** in FIGS. **6**A to **6**J, the damping piece **1030** or the damping pieces **1030** may be disposed on the front side of the cymbal **1010**. In addition, although each of the examples in which the invention is applied to a cymbal has been described above, the invention may be applied to a hi-hat cymbal, as illustrated in FIG. **6**L. In this case, for example, mounting of any of the aforementioned damping pieces **1030** is applied to one or each of an upper cymbal **1010**A and a lower cymbal **1010**B. Incidentally, although there is a case where a solid portion of the damping piece **1030** is interposed between the upper cymbal **1010**A and the lower cymbal **1010**B, there is no problem if the solid portion of the damping piece **1030** is located partially in a circum-

ferential direction. That is, it is because, during clashing between the two cymbals, the two cymbals can clash with each other properly to generate sound in a place where the solid portion of the damping piece **1030** is absent.

Incidentally, in the aforementioned examples, the length of the connection portion is set in advance so that a proper urging force or urging forces can be exerted. However, adjustment mechanisms for adjusting the length of the connection portion may be provided as shown in FIGS. **7**A to **7**C.

For example, the following configuration may be made as shown in FIG. **7**A. That is, a lock mechanism **1039** which can change a lock position relative to a wire **1131** may be provided so that, of the wire **1131**, the length corresponding to the connection portion **1031** can be changed stepwise. Configuration in which the angle of the lock mechanism **1039** is changed to lock or release the wire **1131** may be conceived regardless of the configuration of the lock mechanism **1039**. A length adjustment mechanism which can adjust the length continuously may be used.

As shown in FIG. **7**B, a turnbuckle mechanism may be used for the connection portion **1031**. A turnbuckle of any form such as a split frame form or a pipe form may be used. Alternatively, the following configuration may be made as shown in FIG. **7**C. That is, the connection portion **1031** is constituted by two plate members **1131**A and **1131**B and the plate member **1131**A is coupled to the plate member **1131**B by a bolt **1041** through a long hole **1040** provided in the plate member **1131**A. The entire length of the connection portion **1031** can be adjusted by a fastening position of the bolt **1041** relative to the long hole **1040**.

With such an adjustment mechanism, the degree of damping can be adjusted. In addition, the damping piece **1030** may be made of inelastic metal alone etc. For example, with the configuration in FIG. **7**A or **7**B, the length of the connection portion **1031** can be easily adjusted manually after the opposite end portions of the damping piece **1030** are engaged to engagement portions as subjects to be engaged. Accordingly, it is possible to give suitable tension to the cymbal **1010** even by the damping piece **1030** made of metal.

Fourth Embodiment

In the configuration which has been described above, the damping piece **1030** is disposed on either the front side or the back side of the cymbal **1010**. However, the damping piece **1030** may be disposed separately on each of the front side and the back side of the cymbal **1010**. In addition, an integrated damping piece **1030** which is disposed on the front side and the back side of the cymbal **1010** may be used as will be described as a fourth embodiment.

FIG. **8**A is a schematic sectional view of a cymbal to which a cymbal according to the fourth embodiment is applied. FIG. **8**B is a perspective view of a damping piece **1030**.

As shown in FIG. **8**B, the damping piece **1030** has an upper connection portion **1031**B and a lower connection portion **1031**A, which serve as a connection portion **1031**. An attachment hole **1032**A is formed in an end portion **1031**Aa of the lower connection portion **1031**A which also serves as one end portion of the connection portion **1031**, and an attachment hole **1032**B is formed in an end portion **1031**Ba of the upper connection portion **1031**B which also serves as the other end portion of the connection portion **1031**. The upper connection portion **1031**B and the lower connection portion **1031**A are coupled to each other through a coupling portion **1036**. Incidentally, it is not necessary to give a bending habit to the connection portion **1031** in the coupling portion **1036** in advance. A range of from the end portion **1031**Aa to the end portion **1031**Ba through the coupling portion **1036** may be flat in a free state.

As shown in FIG. **8**A, a side of a rod **1021** on an upper side of a cup portion **1011** is fastened by a clamp **1025** through a buffer material **1024**. The attachment hole **1032**A is engaged with a portion **1021***b* (lower engagement portion) interposed between the cup portion **1011** and a buffer material **1023**. The attachment hole **1032**B is engaged with a portion **1021***a* (upper engagement portion) of the rod **1021** interposed between the cup portion **1011** and the buffer material **1024**.

In the configuration, in order to support the cymbal **1010** on the rod **1021**, first, the rod **1021** is inserted into the attachment hole **1032**A from below so that the end portion **1031**Aa of the lower connection portion **1031**A can be interposed between the cup portion **1011** and the buffer material **1023**. Next, the coupling portion **1036** is put around an edge portion **1013***x* and the rod **1021** is inserted into the attachment hole **1032**B so that the end portion **1031**Ba of the upper connection portion **1031**B can be interposed between the cup portion **1011** and the buffer material **1024**. Then, the end portion **1031**Ba and the buffer material **1024** are fastened by the clamp **1025** from the upper side of the cup portion **1011**.

A length of the connection portion **1031** (a length between the attachment holes **1032**A and **1032**B) is slightly shorter than a distance between the portion **1021***b* and the portion **1021***a* through the edge portion **1013***x*. Thus, the lower connection portion **1031**A and the upper connection portion **1031**B are brought into a tensile state respectively. Due to elasticity of the lower connection portion **1031**A and the upper connection portion **1031**B, the edge portion **1013***x* is urged toward a place where the portions **1021***b* and **1021***a* are located, i.e. toward the radial center of the cymbal **1010**. When considered in contrast with the first embodiment, the portions **1021***b* and **1021***a* correspond to the "first engagement portions" respectively, and the edge portion **1013***x* corresponds to the "second engagement portion".

Incidentally, the shape of a curved portion corresponding to the curved portion **1031***c* (FIG. **5**B) in the middle of the upper connection portion **1031**B in the radial direction of the cymbal **1010** may be used.

According to the embodiment, it is possible to obtain the same effect as that in the first embodiment in order to reduce volume without excessively affecting hitting sound. In addition, the cymbal **1010** does not have to have any engagement hole. Accordingly, versatility of the damping piece **1030** is also wide. In addition, since the configuration of the damping piece **1030** is simple, manufacturing cost can be reduced. Since sound can be damped from the opposite front and back sides, a sound damping effect is high.

Incidentally, in the configuration of FIGS. **8**A and **8**B, a hook-like attachment portion **1033**A (FIG. **5**C) may be used in place of the attachment holes **1032**A and **1032**B in one or each of the end portion **1031**Aa of the lower connection portion **1031**A and the end portion **1031**Ba of the upper connection portion **1031**B.

Fifth Embodiment

FIG. **9**A is a schematic sectional view of a cymbal type percussion instrument according to a fifth embodiment of the present invention. FIG. **9**B is a schematic perspective view of the cymbal type percussion instrument seen

obliquely from top (front). The cymbal type percussion instrument has an acoustic cymbal **2010** (hereinafter referred to as cymbal **2010** simply) which is mainly made of metal. The cymbal **2010** has basic characteristics as an acoustic percussion instrument which is performed in such a manner that it is hit by a performer to make vibration to thereby produce performance sound. In addition, the cymbal **2010** also has characteristics as an electronic instrument which electronically produces music correspondingly to hitting detected by a hitting sensor as will be described later.

The cymbal **2010** has a cup portion **2011**, and a bow portion **2012** which is coupled to the cup portion **2011**. The cup portion **2011** and the bow portion **2012** are formed integrally into a disk shape. The cup portion **2011** bulges slightly upward in a bowl shape from the bow portion **2012**. An insertion hole **2014** is formed in the center of the cup portion **2011**. An outer circumferential edge of the bow portion **2012** serves as an edge portion **2013**. When being placed horizontally, the bow portion **2012** is curved gently so as to be inclined downward as it goes toward an outer side in a radial direction. The bow portion **2012** has a front face **2012***a* and a back face **2012***b*. The front face **2012***a* is a face which is mainly hit. In addition thereto, the edge portion **2013** or the cup portion **2011** may be also a subject to be hit.

The cymbal **2010** is supported by a stand **2100** (FIG. **9**B) serving as a support having a rod **2021**. As a damping device for reducing hitting sound of the cymbal **2010**, a damping piece **2030** is mounted on the cymbal **2010**. The cup portion **2011** and a connection portion **2031** of the damping piece **2030** are interposed between an upper buffer material **2024** and a lower buffer material **2023**. The lower buffer material **2023** is disposed on a pedestal **2022**. The rod **2021** is inserted into the insertion hole **2014** of the cup portion **2011** from below and fastened by a clamp **2025** through the buffer material **2024**. The clamp **2025** serves as a wing nut. Thus, the cymbal **2010** is supported on the rod **2021**. The rod **2021** is fitted to the insertion hole **2014** loosely. The cymbal **2010** can swing with respect to the rod **2021** to some degree. In addition, as to rotation, the cymbal **2010** can rotate in a restriction range restricted by a restriction portion **2052** which will be described later. Incidentally, the buffer material **2023** may be shaped like a cylinder.

A hitting sensor **2042** is disposed on the back face **2012***b* of the bow portion **2012**. The hitting sensor **2042** includes a piezoelectric device etc. which detects vibration of the cymbal **2010**. The configuration of the hitting sensor **2042** is not limited. Although not shown, the percussion instrument has a music generating portion having a sound source, and a music control portion including a CPU. The music control portion makes control to generate sound from the music generating portion based on a detection result of the hitting sensor **2042**. Incidentally, whether to generate music based on a detection result of the hitting sensor **2042** or not can be designated arbitrarily by a performer by mode change.

A fixation portion **2051** is fixed to the rod **2021** under a pedestal **2022**. A fixation form of the fixation portion **2051** is not limited. The fixation portion **2051** may be formed integrally with the rod **2021**. A restriction portion **2052** is fixed to the fixation portion **2051**. In an example of FIG. **9**A, the restriction portion **2052** is a protruding stick formed into an L-shape in side view. However, the restriction portion **2052** can have any form of external appearance. The restriction portion **2052** can be fixed to the fixation portion **2051** in any form. The restriction portion **2052** may be formed integrally with the fixation portion **2051**. In any case, the restriction portion **2052** has a fixation relation to the stand **2100** through the fixation portion **2051**. The fixation portion **2051** and the restriction portion **2052** are made of a high-rigidity material such as metal or a hard resin.

An upper end of the restriction portion **2052** is inserted into a lock portion H which serves as a lock hole formed in the connection portion **2031** of the damping piece **2030**. Thus, rotation of the damping piece **2030** can be restricted. The damping piece **2030** cannot rotate freely relatively to the cymbal **2010**. Accordingly, a rotation range of the cymbal **2010** can be restricted through the damping piece **2030**.

FIG. **9**C is a perspective view of the damping piece **2030**. In FIG. **9**A, the damping piece **2030** is illustrated to be thick in thickness with exaggeration. The damping piece **2030** has the connection portion **2031** which is formed integrally as an elastic member such as rubber, an electric resin or a spring. Incidentally, any other portion than the connection portion **2031** in the damping piece **2030** may be constituted by a harder member than the connection portion **2031**. An attachment hole **2032** is formed in one end portion **2031***a* of the connection portion **2031** in a longitudinal direction, and a hook-like attachment portion **2033** is formed in the other end portion **2031***b* of the connection portion **2031**. The attachment hole **2032** has a size large enough to be penetrated by the rod **2021**. The lock portion H for locking the restriction portion **2052** is formed in the connection portion **2031**. The lock portion H is formed between the attachment hole **2032** and the attachment portion **2033**.

An engagement hole **2015** is formed in the bow portion **2012** (FIGS. **9**A and **9**B). The engagement hole **2015** is an engagement function portion which is provided in a position closer to the edge portion **2013** than the cup portion **2011** in the radial direction. In the embodiment, the engagement hole **2015** is an example of a "second engagement portion".

The damping piece **2030** connects a portion **2021***b* of the rod **2021** and the engagement hole **2015** to each other. The portion **2021***b* is interposed between the cup portion **2011** and the buffer material **2023**. In the embodiment, particularly the portion **2021***b* of the rod **2021** is an example of a "first engagement portion". That is, in order to support the cymbal **2010** on the rod **2021**, the rod **2021** is inserted into the attachment hole **2032** of the damping piece **2030** so that the one end portion **2031***a* of the damping piece **2030** can be interposed between the cup portion **2011** and the buffer material **2023**, and the cup portion **2011** and the one end portion **2031***a* of the damping piece **2030** are fastened by the clamp **2025** through the buffer material **2024**. Further, the attachment portion **2033** in the other end portion **2031***b* of the damping piece **2030** is inserted into the engagement hole **2015** from below so as to be engaged therewith.

A length of the connection portion **2031** (a length between the attachment hole **2032** and the attachment portion **2033**) in a free state is set to be slightly shorter than a distance between the portion **2021***b* and the engagement hole **2015**. Accordingly, when the attachment hole **2032** is engaged with the portion **2021***b* and the attachment portion **2033** is engaged with the engagement hole **2015**, the connection portion **2031** is brought into a tensile state. Due to elasticity of the connection portion **2031**, the connection portion **2031** urges the portion **2021***b* and the engagement hole **2015** in a direction to approach each other. The portion **2021***b* is a part of the rod **2021** fixed to the stand **2100**. Accordingly, an urging force F**1** toward the radial center of the cymbal **2010** where the insertion hole **2014** is located acts on the engagement hole **2015** relatively (FIG. **9**B). As a result, as the cymbal **2010**, the insertion hole **2014** and the engagement hole **2015** are urged in a direction to approach each other.

The connection portion **2031** is in a non-abutment state with the bow portion **2012** in at least a part of a region facing the back face **2012***b* of the bow portion **2012**. In the example of FIG. **9**A, the bow portion **2012** is curved to be convex upward. Accordingly, the connection portion **2031** is in a non-abutment state with the bow portion **2012** in almost the entire region.

The attachment portion **2033** of the damping piece **2030** is exposed on the front side of the cymbal **2010**. For this reason, a performer may want to hit a region in which the attachment portion **2033** is absent, so that the attachment portion **2033** cannot be an obstacle. In addition, it is desirable that a region close to the location of the hitting sensor **2042** in a circumferential direction is hit in order to stabilize detection accuracy of hitting by the hitting sensor **2042**. Therefore, in the embodiment, the hitting sensor **2042** is disposed in a region on an opposite side to the engagement hole **2015** across the insertion hole **2014**. Assume that the cymbal **2010** is configured to rotate freely. In this case, the hitting position of the cymbal **2010** in the circumferential direction changes at all times. At one time the attachment portion **2033** approaches the region where hitting is being performed while the hitting sensor **2042** leaves the same region at another time. Therefore, there is a fear that the performer cannot hit the proper position.

Therefore, in the embodiment, the damping piece **2030** serving as a mounting member mounted on the cymbal **2010** is used to indirectly restrict rotation of the cymbal **2010** based on insertion/engagement between the lock portion H of the connection portion **2031** and the restriction portion **2052**. To set the position of the cymbal **2010** in a rotation direction, the performer may perform after locating the vicinity of the hitting sensor **2042** in a range where the performer expects to hit the cymbal **2010**. Due to restriction of rotation of the cymbal **2010**, the performer can hit the vicinity of the hitting sensor **2042** while keeping away from the attachment portion **2033**. Incidentally, rotation of the cymbal **2010** does not have to be stopped completely even during rotation restriction. Accordingly, the relation between the lock portion H and the restriction portion **2052** may be loose fitting.

The restriction portion **2052** can be locked to the lock portion H in the state in which the damping piece **2030** has been mounted on the cymbal **2010**. That is, since the damping piece **2030** has elasticity, it is easy to insert the restriction portion **2052** into the lock portion H by use of the elasticity of the connection portion **2031**. Incidentally, an elastic characteristic of bending in an up/down direction may be also provided in the restriction portion **2052**.

FIG. **10** is a graph showing temporal change in volume of hitting sound due to mounting with/without a damping piece. In FIG. **10**, the abscissa designates elapsed time (second) after hitting, and the ordinate designates volume (dB). When no damping piece is mounted, the volume does not decrease to 0 dB even after a lapse of about 1.0 second. On the other hand, when the damping piece according to the background art is mounted to mute sound substantially completely, the sound is completely attenuated before a lapse of about 0.2 seconds. On the contrary, when the damping piece **2030** according to the embodiment is mounted, the volume is attenuated to 0 dB after a lapse of about 0.5 seconds. Pay attention to the maximum level. The maximum level in the case where the damping piece **2030** according to the embodiment is mounted is suppressed to be lower than that in any of the case where no damping piece is mounted and the case where the damping piece according to the background art is mounted. That is, it is possible to suppress the volume to be lower while keeping a moderate attenuation time of the sound.

According to analysis of the present applicant, it has been proved that such an effect can be obtained when the insertion hole **2014** and the engagement hole **2015** are urged in a direction to approach each other in the cymbal **2010**. In the embodiment which is different from the background-art configuration in which a soft damping piece is mounted on the cymbal, tension in a compression direction is applied to apart of the cymbal **2010** so that volume can be suppressed to be lower without excessively attenuating sound rich in a high frequency.

In addition, the connection portion **2031** of the damping piece **2030** has a region which belongs to the region facing the bow portion **2012** and which is in a non-abutment state with the bow portion **2012**. Accordingly, vibration of the bow portion can be prevented from being suppressed in a wide area as in a configuration in which the connection portion **2031** touches the bow portion in the entire region as described in the background art. Thus, hitting sound can be prevented from changing largely from original cymbal sound.

According to the embodiment, the restriction portion **2052** is fixed to the fixation portion **2051** fixed to the rod **2021** of the stand **2100**, and the restriction portion **2052** is locked to the lock portion H of the damping piece **2030**. Thus, it is possible to restrict the cymbal **2010** from rotating. It is possible to perform hitting in the proper region which is always fixed by the rotation restriction. Accordingly, it is possible to prevent the damping piece **2030** from becoming an obstacle to hitting. In addition, detection accuracy performed by the hitting sensor **2042** is stable. Moreover, the damping piece **2030** mounted on the cymbal **2010** is used for the rotation restriction. Accordingly, additional treatment for forming a hole, a lock portion, etc. in the cymbal **2010** is not necessarily performed only for the purpose of the rotation restriction. Thus, application of the damping piece **2030** to any widely used cymbal becomes easy. Accordingly, no special treatment etc. is performed on the acoustic cymbal so that it is possible to produce sound with the volume, the tone, etc. as the acoustic cymbal. In addition, it is possible to restrict the rotation range of the cymbal to increase the detection accuracy of hitting, and it is possible to prevent the damping piece **2030** from becoming an obstacle to hitting. In addition, since the damping piece **2030** is used, it is not necessary to increase the number of constituent components.

According to the embodiment, the damping piece **2030** is mounted. Thus, it is possible to reduce the volume without excessively affecting hitting sound.

In addition, in the damping piece **2030**, the portion which is exposed on the front side of the cymbal **2010** is only the attachment portion **2033**. Accordingly, it is possible to secure a large region where the damping piece **2030** does not have to be hit directly, i.e. a large hitting area where feeling of hitting does not change, in comparison with the background-art configuration in which the cymbal is largely covered with the damping piece from above. Accordingly, it is possible to reduce the possibility that the feeling of hitting may be spoiled. In addition, it is also possible to prevent external appearance of the cymbal **2010** from changing largely. Moreover, the connection portion **2031** of the damping piece **2030** is constituted by an elastic member to exert an urging force due to its elasticity. Accordingly, it is possible to generate an urging force with a simple configuration.

Incidentally, the configuration of the portion attached to the cymbal **2010** in the damping piece **2030** is not limited to

the illustrated one. Several modifications will be described later. For example, modifications shown in FIGS. **9**D and **9**E may be used in the embodiment. That is, the attachment portion **2033** of the damping piece **2030** may be not shaped like a hook but formed into a wide shape (FIG. **9**D). The wide attachment portion **2033** which is inserted into the engagement hole **2015** to be engaged therewith can also carry out the same function as that in FIG. **9**C. The damping piece **2030** may be not formed integrally but a metal fitting **2034** may be attached to the other end portion **2031***b* and a hook-like attachment portion **2033** may be formed in the metal fitting **2034** alternatively, as shown in FIG. **9**E. Incidentally, it may go well as long as at least a part (mainly the connection portion **2031**) of the damping piece **2030** has elasticity. Accordingly, configuration may be made in such a manner that a metal fitting etc. where the attachment hole **2032** is formed is also attached to the one end portion **2031***a*.

Incidentally, the number of the engagement holes **2015** formed in the cymbal **2010** is not necessarily one, but one of the small holes used in the aforementioned Patent Literature 4 may be used.

Sixth Embodiment

FIG. **11**A is a schematic sectional view of a cymbal type percussion instrument according to a sixth embodiment. FIG. **11**B is a schematic perspective view of a cymbal seen obliquely from top. FIG. **11**C is a perspective view of a damping piece **2030**. A buffer material **2024**, a clamp **2025**, etc. are not shown in FIGS. **11**A and **11**B.

The fifth embodiment has a configuration in which the attachment portion **2033** of the damping piece **2030** is engaged with the engagement hole **2015** formed in the cymbal **2010**. In contrast with this, the damping piece **2030** in the sixth embodiment is connected to an edge portion **2013** which is an outer circumferential edge of a bow portion **2012**. In addition, the shape of the damping piece **2030** and the shape of a restriction portion **2052** engaged with the damping piece **2030** are made different from those in the fifth embodiment.

In the embodiment, the damping piece **2030** connects a portion **2021***b* of a rod **2021** and an edge portion **2013***x* to each other. The edge portion **2013***x* is an arbitrary place in a circumferential direction in the edge portion **2013** which is the outer circumferential edge of the bow portion **2012**. The position of the edge portion **2013***x* is not limited. In the embodiment, the edge portion **2013***x* is an example of the "second engagement portion".

An attachment hole **2032** is formed in an intermediate portion of the damping piece **2030** in a longitudinal direction. A length between the attachment hole **2032** and the attachment portion **2033** in the damping piece **2030** is set to be slightly shorter than a distance between the portion **2021***b* and the edge portion **2013***x*. A lock portion H is formed in one end portion **2031***e* of the damping piece **2030** (FIGS. **11**A and **11**C). The attachment portion **2033** of the damping piece **2030** is exposed on a front side of the cymbal **2010**. It is desirable that the damping piece **2030** is mounted so that the attachment portion **2033** can be positioned in a region on an opposite side to a hitting sensor **2042** across an insertion hole **2014**.

As shown in FIG. **11**A, the rod **2021** is inserted into the attachment hole **2032** of the damping piece **2030** so as to be engaged therewith. On the other hand, the hook-like attachment portion **2033** in the other end portion **2031***b* of the damping piece **2030** is hooked onto the edge portion **2013***x* from its lower outer circumferential side so as to be engaged therewith. When the attachment hole **2032** is engaged with the portion **2021***b* and the attachment portion **2033** is engaged with the edge portion **2013***x*, a connection portion **2031** is brought into a tensile state. Due to elasticity of the connection portion **2031**, the connection portion **2031** urges the portion **2021***b* and the edge portion **2013***x* in a direction to approach each other. As a result, the insertion hole **2014** and the edge portion **2013***x* are urged in the direction to approach each other so that an urging force F**2** toward the insertion hole **2014** can act on the edge portion **2013***x* (FIG. **11**B). In addition, in the same manner as in the fifth embodiment, the connection portion **2031** is brought into a non-abutment state with the bow portion **2012** in almost the entire region.

In the cymbal **2010**, the insertion hole **2014** and the edge portion **2013***x* are urged in a direction to approach each other. Accordingly, it is possible to obtain an effect that it is possible to suppress volume to be lower while keeping a moderate attenuation time of sound, as described in FIG. **10**.

In addition, the side of the one end portion **2031***e* located more forward than the attachment hole **2032** in the damping piece **2030** is disposed to be curved and suspended downward. The embodiment has the same basic configuration as that in the fifth embodiment except the shape of a fixation portion **2051** and the shape of a restriction portion **2052**. The restriction portion **2052** is inserted into the lock portion H formed in the one end portion **2031***e* of the damping piece **2030**, to thereby restrict rotation of the damping piece **2030**. Accordingly, a rotation range of the cymbal **2010** is restricted.

According to the embodiment, it is possible to restrict the rotation range without applying any special treatment etc. to the cymbal so that it is possible to increase detection accuracy of hitting. At the same time, it is possible to obtain the same effect as that in the fifth embodiment in order to prevent the damping piece **2030** from becoming an obstacle to hitting.

According to the embodiment, it is possible to obtain the same effect as that in the fifth embodiment in order to reduce the volume without excessively affecting hitting sound. In addition, it is not necessary to provide any engagement hole **2015** in the cymbal **2010**. Accordingly, versatility of the damping piece **2030** is wider.

Incidentally, the shape of the damping piece **2030** and the position where the lock portion H is provided in the embodiment may be replaced with those in the fifth embodiment respectively. That is, in the fifth embodiment, the restriction portion **2052** may be locked to the lock portion H provided in a position extending further from the position of the attachment hole **2032** in the damping piece **2030** and then suspended downward. Or, in the sixth embodiment, the restriction portion **2052** may be locked to the lock portion H provided between the attachment hole **2032** and the attachment portion **2033**.

Seventh Embodiment

FIG. **12**A is a schematic sectional view of a cymbal type percussion instrument according to a seventh embodiment. FIG. **12**B is a schematic perspective view of a cymbal seen obliquely from top. FIG. **12**C is a perspective view of a damping piece **2030**. A buffer material **2024**, a clamp **2025**, etc. are not shown in FIGS. **12**A and **12**B.

In the seventh embodiment, two engagement holes **2015**A and **2015**B formed in the cymbal **2010** are connected to each other through the damping piece **2030**. Both the engagement holes **2015**A and **2015**B are engagement function portions

which are provided in positions closer to an edge portion **2013** than a cup portion **2011** in a radial direction. The damping piece **2030** shown in FIG. **12**C corresponds to a configuration in which the attachment portion **2033** in the damping piece **2030** configured as shown in FIG. **9**C is provided on each of opposite ends of a connection portion **2031**. That is, a hook-like attachment portion **2033**A is formed in one end portion **2031***a* of the connection portion **2031** in a longitudinal direction, and a hook-like attachment portion **2033**B is formed in the other end portion **2031***b* of the connection portion **2031**. A length of the connection portion **2031** (a length between the attachment portions **2033**A and **2033**B) is set to be slightly shorter than a distance between the engagement holes **2015**A and **2015**B.

A lock portion H is formed in a position longitudinally closer to the attachment portion **2033**A in the damping piece **2030** (FIG. **12**C). The attachment portions **2033**A and **2033**B of the damping piece **2030** are exposed on a front side of the cymbal **2010**. A hitting sensor **2042** is disposed in a region circumferentially far from both the engagement holes **2015**A and **2015**B in the damping piece **2030** (FIG. **12**B).

Regardless of a temporal context as to whether the cymbal **2010** has been supported on a rod **2021** or not, the attachment portion **2033**A in the one end portion **2031***a* of the damping piece **2030** can be inserted into the engagement hole **2015**A from below so as to be engaged therewith, and the attachment portion **2033**B in the other end portion **2031***b* of the damping piece **2030** can be inserted into the engagement hole **2015**B from below so as to be engaged therewith. In this manner, the connection portion **2031** is brought into a tensile state. Due to elasticity of the connection portion **2031**, the engagement holes **2015**A and **2015**B are urged in directions to approach each other. Urging forces F**3** toward each other act on the engagement holes **2015**A and **2015**B (FIG. **12**B). Thus, the urging forces do not have to be directed toward the radial center of the cymbal **2010** in order to obtain a damping effect.

The embodiment has the same basic configuration as the fifth embodiment except the shape of a fixation portion **2051** and the shape of a restriction portion **2052**. An upper end of the restriction portion **2052** is inserted into the lock portion H formed in the connection portion **2031** of the damping piece **2030** so that rotation of the damping piece **2030** can be restricted. Accordingly, a rotation range of the cymbal **2010** can be restricted. The restriction portion **2052** and the damping piece **2030** cooperate with each other to function as a rotation restricting device for restricting the rotation range of the cymbal **2010**.

According to the embodiment, it is possible to restrict the rotation range without applying any special treatment etc. to the cymbal so that it is possible to increase detection accuracy of hitting. At the same time, it is possible to obtain the same effect as that in the fifth embodiment in order to prevent the damping piece **2030** from becoming an obstacle to hitting.

According to the embodiment, it is possible to obtain the same effect as in the fifth embodiment in order to reduce volume without excessively affecting hitting sound.

However, it is desirable that the engagement holes **2015**A and **2015**B as the subjects to be connected by the damping piece **2030** are provided in positions as close to the edge portion **2013** as possible. This is because a higher volume reduction effect can be obtained as a region which receives tension in a compression direction is closer to the edge portion **2013**. For the same reason, it is desirable that the engagement hole **2015** is close to the edge portion **2013** in the fifth embodiment, and the edge portion **2013***x* is set as the subject to be engaged in the sixth embodiment.

Incidentally, a modification shown in FIG. **12**D may be used as to the damping piece **2030** in the embodiment. That is, the example shown in FIG. **9**D may be applied so that one or each of the attachment portions **2033**A and **2033**B of the damping piece **2030** can be not shaped like a hook but formed into a wide shape. Incidentally, the example shown in FIG. **9**E may be applied so that one or each of a metal fitting where the attachment portion **2033**A is formed and a metal fitting where the attachment portion **2033**B is formed can be provided.

The configuration in which one part of the damping piece **2030** is connected to the rod **2021** and another part of the damping piece **2030** is connected to the engagement hole **2015** or the edge portion **2013** of the cymbal **2010** has been described in the fifth or sixth embodiment. In addition, the configuration in which the engagement holes **2015** are connected to each other has been shown by way of example in the seventh embodiment. However, the engagement portions as the subjects to be connected by the damping piece **2030** are not limited to the illustrated ones.

For example, in the fifth and sixth embodiments, when the first engagement portion as one of the subjects to be connected is regarded as the insertion hole **2014** of the cymbal **2010**, the stand **2100** or the portion (the rod **2021** etc.) fixed to the stand **2100**, the second engagement portion as the other of the subjects to be connected may be the edge portion **2013** per se or the engagement function portion provided in a position closer to the edge portion **2013** than the cup portion **2011** in the bow portion **2012**. When this is applied to the seventh embodiment, a plurality of engagement portions as the subjects to be connected may include the edge portion **2013** per se in the cymbal **2010** or the engagement function portions provided in positions closer to the edge portion **2013** than the cup portion **2011** in the bow portion **2012**. It will go well in such a configuration that each of the engagement portions is in a connection relation to at least one of the others of the engagement portions through the damping piece **2030**. Modifications satisfying these conditions will be described with reference to FIGS. **13**A to **13**C and FIGS. **14**A to **14**K.

FIGS. **13**A, **13**B and **13**C are schematic sectional views of cymbals to which damping pieces according to modifications are applied. A buffer material **2024**, a clamp **2025**, etc. are not shown in FIGS. **13**A and **13**C.

First, an example shown in FIG. **13**A can be mainly applied to the fifth embodiment. Thus, a hook **2016** is formed on a back face **2012***b* of a bow portion **2012**. The hook **2016** is located in the same position as the engagement hole **2015** (FIG. **9**A). The hook **2016** is an example of the "second engagement portion". A rod **2021** is inserted into an attachment hole **2032** in one end portion **2031***a* of the damping piece **2030** so as to be engaged therewith. This point is the same as that in the fifth embodiment. On the other hand, the same attachment hole as the attachment hole **2032** is provided in the other end portion **2031***b* of the damping piece **2030** to be engaged with the hook **2016**.

An example shown in FIG. **13**B can be mainly applied to the fifth embodiment, but the damping piece **2030** is disposed on not a back side but a front side of the cymbal **2010**. The configuration shown in FIG. **11**C can be fundamentally used as the configuration of the damping piece **2030**. A curved portion **2031***c* convex upward is formed on a side closer to the other end portion **2031***b* than an attachment hole **2032** in a connection portion **2031** of the damping piece **2030**. A side closer to one end portion **2031***e* than the

attachment hole **2032** of the damping piece **2030** is curved upward to extend. A lock portion H is formed in the one end portion **2031***e* of the damping piece **2030**.

The attachment hole **2032** of the damping piece **2030** is engaged with a portion **2021***a* of a rod **2021** on an upper side than a cup portion **2011**. The portion **2021***a* is an example of the "first engagement portion". An attachment portion **2033** in the other end portion **2031***b* of the damping piece **2030** is inserted into an engagement hole **2015** from above so as to be engaged therewith. The curved portion **2031***c* is in a non-abutment state with a front face **2012***a* of a bow portion **2012**. Incidentally, the connection portion **2031** in at least apart of a region facing the bow portion **2012** has a shape which is not limited to the shape like the curved portion **2031***c* but may be any shape as long as it can be brought into a non-abutment state with the bow portion **2012**. In addition, the shape like the curved portion **2031***c* may be provided in the middle of the connection portion **2031** in a radial direction of the cymbal **2010**.

A fixation portion **2051** is fixed to the rod **2021** above the clamp **2025**. The fixation portion **2051** is fixed detachably, for example, by a screw **2053**. A restriction portion **2052** is fixed to the fixation portion **2051**. The restriction portion **2052** is inserted into the lock portion H which is formed in the one end portion **2031***e* of the damping piece **2030** so that rotation of the damping piece **2030** can be restricted. Accordingly, a rotation range of the cymbal **2010** can be restricted.

An example shown in FIG. **13**C can be mainly applied to the fifth embodiment. The damping piece **2030** preferably has the configuration shown in FIG. **12**C. Before the cymbal **2010** is supported on a rod **2021**, an attachment portion **2033**A in one end portion **2031***a* of the damping piece **2030** is inserted into an insertion hole **2014** from below so as to be engaged therewith and an attachment portion **2033**B in the other end portion **2031***b* of the damping piece **2030** is inserted into an engagement hole **2015** from below so as to be engaged therewith. The attachment portion **2033**A is an example of the "first engagement portion" and the engagement hole **2015** is an example of the "second engagement portion".

Incidentally, in the example of FIG. **13**B or **13**C, the attachment portion **2033** or the attachment portion **2033**B may be hooked on the edge portion **2013** so as to be engaged therewith as in the example of FIG. **11**A. In this case, the edge portion **2013** serves as the "second engagement portion". In addition, in the example shown in FIG. **12**A, the damping piece **2030** may be disposed on the front side of the cymbal **2010**.

FIGS. **14**A to **14**K are schematic views of cymbals **10** mounted with damping pieces **2030** according to modifications. In each of FIGS. **14**A to **14**K, each hole corresponding to an engagement hole **2015** (FIG. **9**A etc.) provided in the cymbal **2010** is designated by a white circle. However, the hole may be replaced by a hook **2016** (FIG. **13**A). A lock portion H provided in the damping piece **2030** is also designated by a white circle. Of an edge portion **2013**, each edge portion **2013***x* is a place with which the damping piece **2030** is engaged. As the shape of a portion engaged with each engagement portion in the damping piece **2030**, a hook shape or a hole etc. may be used suitably in accordance with the shape of the engagement portion. The number of the engagement portions as subjects to be connected by the damping piece **2030** or the damping pieces **2030** may be three (FIGS. **14**A to **14**D and **14**J), four (FIGS. **14**E to **14**H) or five (FIG. **14**I), or may be six or more. According to some configurations, the damping piece **2030** alone may connect all three or more engagement portions to one another (FIGS. **14**A, **14**D, **14**E, **14**H, **14**I and **14**J). Alternatively, two or more damping pieces **2030** which connect ones of the engagement portions to each other may be provided (FIGS. **14**B, **14**C, **14**F and **14**G). The lock portion H is formed in a proper position of the damping piece **2030**. In addition, a protrusive piece **2031***f* may be formed integrally with the damping piece **2030** so that the lock portion H can be formed in the protrusive piece **2031***f* (FIGS. **14**A, **14**E, and **14**G). Although a hitting sensor **2042** is not shown in each of FIGS. **14**A to **14**K, it is preferable that the hitting sensor **2042** is provided on a back side of the cymbal **2010** in a region where the damping piece **2030** is not exposed on the upper side.

Incidentally, although the damping piece **2030** or the damping pieces **2030** are disposed on the back side of the cymbal **2010** in FIGS. **14**A to **14**J, the damping piece **2030** or the damping pieces **2030** may be disposed on a front side of the cymbal **2010**. In addition, although the examples in each of which the invention is applied to a cymbal have been described above, the invention may be applied to a hi-hat cymbal, as illustrated in FIG. **14**K. In this case, for example, mounting of any of the aforementioned damping pieces **2030** is applied to one or each of an upper cymbal **2010**A and a lower cymbal **2010**B. Incidentally, although there is a case where a solid portion of the damping piece **2030** is interposed between the upper cymbal **2010**A and the lower cymbal **2010**B, there is no problem if the solid portion of the damping piece **2030** is located partially in a circumferential direction. That is, it is because, during clashing between the two cymbals, the two cymbals can clash with each other properly to generate sound in a place where the solid portion of the damping piece **2030** is absent. In addition, in the example of FIG. **14**K, the configuration shown in FIG. **13**B can be used as a configuration for engagement between the restriction portion **2052** and the lock portion H above the upper cymbal **2010**A.

Incidentally, in the aforementioned examples, the length of the connection portion is set in advance so that a proper urging force or urging forces can be exerted. However, adjustment mechanisms for adjusting the length of the connection portion may be provided as illustrated in FIGS. **15**A to **15**D.

For example, the following configuration may be made as shown in FIG. **15**A. That is, a lock mechanism **2039** which can change a lock position relative to a wire **2131** may be provided so that, of the wire **2131**, the length corresponding to the connection portion **2031** can be changed stepwise. A configuration in which the angle of the lock mechanism **2039** is changed to lock or release the wire **2131** may be conceived regardless of the configuration of the lock mechanism **2039**. A length adjustment mechanism which can adjust the length continuously may be used. Incidentally, when the configuration in FIG. **15**A is applied to the sixth embodiment (FIG. **11**A), a lock portion H may be provided at a front end of a portion extending from an attachment hole **2032**, as shown in FIG. **15**B. In addition, as shown in FIG. **15**C, a turnbuckle mechanism may be used for the connection portion **2031**. A turnbuckle of any form such as a split frame form or a pipe form may be used. Alternatively, the following configuration may be made as shown in FIG. **15**D. That is, the connection portion **2031** is constituted by two plate members **2131**A and **2131**B and the plate member **2131**A is coupled to the plate member **2131**B by a bolt **2041** through a long hole **2040** provided in the plate member **2131**A. The entire length of the connection portion **2031** can be adjusted by a fastening position of the bolt **2041** relative

to the long hole **2040**. With such an adjustment mechanism, the degree of damping can be adjusted. In addition, the damping piece **2030** may be made of inelastic metal alone etc. For example, with the configuration in FIG. **15**A or **15**B, the length of the connection portion **2031** can be easily adjusted manually after opposite end portions of the damping piece **2030** are engaged with engagement portions as subjects to be engaged. Accordingly, it is possible to give suitable tension to the cymbal **2010** even by the damping piece **2030** made of metal.

In each of the aforementioned embodiments, the restriction portion **2052** which is a stick and the lock portion H which is a hole are used in combination. However, combination of the both is not limited to any of the illustrated ones as long as the restriction portion **2052** is engaged with the damping piece **2030** to restrict its rotational displacement. For example, according to one configuration, as shown in FIG. **15**E, a restriction portion **2052** may be disposed in a form in which the damping piece **2030** is held from two sides in the rotation direction of the cymbal **2010**. For example, the damping piece **2030** shown in FIG. **9**C may be modified so that lock portions H**2** as notched portions can be formed in the connection portion **2031**. On the other hand, a pair of two stick-shaped portions **2052***a* are formed protrusively in the restriction portion **2052**. The restriction portion **2052** is disposed so that the lock portions H**2** can be located between the pair of stick-shaped portions **2052***a*. The lock portions H**2** may be held between the stick-shape portions **2052***a* with slight margins. Such a configuration can be applied to modifications in the aforementioned embodiments.

Eighth Embodiment

In the configuration which has been described above, the damping piece **2030** is disposed on either the front side or the back side of the cymbal **2010**. However, the damping piece **2030** may be disposed separately on each of the front side and the back side of the cymbal **2010**. In addition, an integrated damping piece **2030** which is disposed on a front side and aback side of a cymbal **2010** may be used as will be described as an eighth embodiment.

FIG. **16**A is a schematic sectional view of a cymbal type percussion instrument according to the eighth embodiment. FIG. **16**B is a perspective view of the damping piece **2030**.

As shown in FIG. **16**B, the damping piece **2030** has an upper connection portion **2031**B and a lower connection portion **2031**A, which serve as a connection portion **2031**. An attachment hole **2032**A is formed in an end portion **2031**Aa of the lower connection portion **2031**A which also serves as one end portion of the connection portion **2031**, and an attachment hole **2032**B is formed in an end portion **2031**Ba of the upper connection portion **2031**B which also serves as the other end portion of the connection portion **2031**. The upper connection portion **2031**B and the lower connection portion **2031**A are coupled to each other through a coupling portion **2036**. Incidentally, it is not necessary to give a bending habit to the connection portion **2031** in the coupling portion **2036** in advance. A range of from the end portion **2031**Aa to the end portion **2031**Ba through the coupling portion **2036** may be flat in a free state.

A lock portion H to which a restriction portion **2052** can be locked is formed in the lower connection portion **2031**A. The lock portion H is formed between the attachment hole **2032**A and the coupling portion **2036**. Configuration of a fixation portion **2051** and configuration of the restriction portion **2052** are the same as those in the fifth embodiment. An upper end of the restriction portion **2052** is inserted into the lock portion H so that rotation of the damping piece **2030** can be restricted. Accordingly, a rotation range of the cymbal **2010** can be restricted. It is desirable that the damping piece **2030** is mounted so that the damping piece **2030** can be positioned in a region on an opposite side to a location side of a hitting sensor **2042** across a rod **2021**.

As shown in FIG. **16**A, a portion of the rod **2021** on an upper side of a cup portion **2011** is fastened by a clamp **2025** through a buffer material **2024**. The attachment hole **2032**A is engaged with a portion **2021***b* (lower engagement portion) interposed between the cup portion **2011** and a buffer material **2023**. The attachment hole **2032**B is engaged with a portion **2021***a* (upper engagement portion) of the rod **2021** interposed between the cup portion **2011** and the buffer material **2024**.

In the configuration, in order to support the cymbal **2010** on the rod **2021**, first, the rod **2021** is inserted into the attachment hole **2032**A from below so that the end portion **2031**Aa of the lower connection portion **2031**A can be interposed between the cup portion **2011** and the buffer material **2023**. Next, the coupling portion **2036** is put around an edge portion **2013***x* and the rod **2021** is inserted into the attachment hole **2032**B so that the end portion **2031**Ba of the upper connection portion **2031**B can be interposed between the cup portion **2011** and the buffer material **2024**. Then, the end portion **2031**Ba and the buffer material **2024** are fastened by the clamp **2025** from the upper side of the cup portion **2011**.

A length of the connection portion **2031** (a length between the attachment holes **2032**A and **2032**B) is slightly shorter than a distance between the portion **2021***b* and the portion **2021***a* through the edge portion **2013***x*. Thus, the lower connection portion **2031**A and the upper connection portion **2031**B are brought into a tensile state respectively. Due to elasticity of the lower connection portion **2031**A and the upper connection portion **2031**B, the edge portion **2013***x* is urged in a direction toward a place where the portions **2021***a* and **2021***b* are located, i.e. toward the radial center of the cymbal **2010**. When considered in contrast with the fifth embodiment, the portions **2021***b* and **2021***a* correspond to the "first engagement portions" respectively, and the edge portion **2013***x* corresponds to the "second engagement portion".

Incidentally, the shape of a curved portion corresponding to the curved portion **2031***c* (FIG. **13**B) in the middle of the upper connection portion **2031**B in the radial direction of the cymbal **2010** may be used.

According to the embodiment, it is possible to restricting a rotation range without applying special treatment etc. to the cymbal so that it is possible to increase detection accuracy of hitting. At the same time, it is possible to obtain the same effect as that in the fifth embodiment in order to prevent the damping piece **2030** from becoming an obstacle to hitting.

According to the embodiment, it is possible to obtain the same effect as that in the fifth embodiment in order to reduce volume without excessively affecting hitting sound. Particularly, the cymbal **2010** does not have to have any engagement hole for mounting the damping piece **2030**. Accordingly, versatility of the damping piece **2030** is also wide. In addition, since the configuration of the damping piece **2030** is simple, the manufacturing cost can be reduced. In addition, since sound can be damped from the opposite front and back sides, a sound damping effect is high.

In addition, although the embodiment has been described in the case where the mounting member is used as the

damping piece, the mounting member may be used for changing the tone like a general mute. For example, the magnitude of tension and a contact area of the mounting member may be set desirably to change the tone. Variations may be prepared in advance as to the magnitude of the tension and the contact area of the mounting member so that a desired variation can be selected from the variations and used.

Incidentally, in the configuration of FIGS. **16**A and **16**B, a hook-like attachment portion **2033**A (FIG. **13**C) may be used in one or each of the end portion **2031**Aa of the lower connection portion **2031**A and the end portion **2031**Ba of the upper connection portion **2031**B in place of the attachment holes **2032**A and **2032**B.

Also in the embodiment, the configuration illustrated in FIG. **13**B can be used as a configuration for engagement between the restriction portion **2052** and the lock portion H above the cymbal **2010**.

Incidentally, in each of the aforementioned embodiments, when an effect is mainly demanded for increasing the detection accuracy of hitting without requiring the damping effect of the cymbal and for preventing the mounting member from becoming an obstacle to hitting, the mounting member engaged with the restriction portion **2052** does not have to be the damping piece **2030**. For example, the mounting member may be a member mounted fixedly on the cymbal **2010** like an accessory etc.

Although the invention has been described as a device for restricting the rotation range, the rotation direction is not limited but the device may serve for restricting rotation (i.e. revolution) when the cymbal can revolve in both directions around the rod.

Although the invention has been described above in detail based on its preferred embodiments, the invention is not limited to the specific embodiments. Various modes without departing from the gist of the invention may be also contained in the invention. Parts of the aforementioned embodiments or the aforementioned modifications may be combined suitably.

What is claimed is:

1. A mounting device for a cymbal type percussion instrument, the cymbal type percussion instrument including at least one cymbal supported on a support, the mounting device comprising:

a mounting member which is mounted in at least two different positions on the cymbal type percussion instrument, the mounting member which is configured to suppress motion of the cymbal when the mounting member is mounted in the at least two different positions on the cymbal type percussion instrument so as to hold a position of the mounting member relative to the cymbal, the mounting member which includes a connection portion which connects a first engagement portion and a second engagement portion to each other, wherein,

when the first engagement portion and the second engagement portion are connected to each other, the connection portion urges the first engagement portion and the second engagement portion in a direction to approach each other, and at least a part of the connection portion, which faces a bow portion of the cymbal, is brought into a non-abutment state with the bow portion,

wherein the connection portion includes an adjustment mechanism which adjusts a length of the connection portion.

2. The mounting device according to claim **1**, wherein

the cymbal includes a cup portion and the bow portion, an insertion hole formed in the cup portion, a rod which is a part of the support inserted into the insertion hole to support the cup portion on the support, the bow portion coupled to the cup portion and having an edge portion as an outer circumferential edge, and

the first engagement portion is one of the insertion hole, the support and a portion fixed to the support, and the second engagement portion is one of the edge portion of the bow portion and an engagement function portion provided in a position closer to the edge portion than the cup portion in the bow portion.

3. A damping device which is the mounting device according to claim **2**, and which is configured to reduce hitting sound of the cymbal by suppressing vibrating motion of the cymbal when the cymbal is hit.

4. The damping device according to claim **3**, wherein

the connection portion is constituted by an elastic member and exerts an urging force due to its elasticity.

5. The damping device according to claim **2**, wherein

the connection portion is constituted by an elastic member and exerts an urging force due to its elasticity.

6. A cymbal type percussion instrument which includes the mounting device according to claim **2**, the cymbal which is an acoustic cymbal which is hit to make vibration to thereby produce sound as performance sound, the cymbal type percussion instrument comprising:

a sensor which is attached to the acoustic cymbal and which is configured to detect the vibration of the acoustic cymbal;

a fixation portion which is fixed to the support; and

a restriction portion which is a part of the fixation portion or fixed to the fixation portion, and which is engaged with the mounting member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating, wherein

the mounting device is configured to suppress rotating motion of the acoustic cymbal when the acoustic cymbal is hit.

7. The cymbal type percussion instrument according to claim **6**, wherein

the mounting member is a damping member which is configured to reduce hitting sound of the acoustic cymbal.

8. A cymbal type percussion instrument which includes the mounting device according to claim **1**, wherein

the cymbal is an acoustic cymbal,

the mounting member is a damping member which is mounted on the acoustic cymbal so that at least a part of the damping member is exposed on an upper side from the acoustic cymbal and which is configured to reduce hitting sound of the acoustic cymbal, and

the cymbal type percussion instrument includes a fixation portion which is fixed to the support, and a restriction portion which is a part of the fixation portion or fixed to the fixation portion and which is engaged with the damping member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating.

9. The cymbal type percussion instrument according claim **8**, further comprising:

a sensor which is attached to the acoustic cymbal and which is configured to detect vibration of the acoustic cymbal.

10. A cymbal type percussion instrument which includes the mounting device according to claim **1**, wherein

the cymbal is an acoustic cymbal,

the mounting member is a damping member which is mounted on the acoustic cymbal so that at least a part of the damping member is exposed on an upper side from the acoustic cymbal and which is configured to reduce hitting sound of the acoustic cymbal,

the cymbal type percussion instrument includes a fixation portion which is fixed to the support, and a restriction portion which is a part of the fixation portion or fixed to the fixation portion and which is engaged with the damping member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating.

11. The cymbal type percussion instrument according to claim **10**, further comprising:

a sensor which is attached to the acoustic cymbal and which is configured to detect vibration of the acoustic cymbal.

12. A cymbal rotation restricting device which is the mounting device according to claim **2**, the cymbal which is an acoustic cymbal, the cymbal rotation restricting device comprising:

a restriction portion which is a part of a fixation portion fixed to the support or fixed to the fixation portion, and which is engaged with the mounting member mounted on the acoustic cymbal to thereby restrict the acoustic cymbal from rotating.

13. The mounting device according to claim **1**, wherein

the connection portion includes a first portion configured to engage with the first engagement portion and a second portion configured to engage with the second engagement portion, and

a first length between the first portion of the connection portion and the second portion of the connection portion in an unconnected state in which the connection portion is not connecting the first engagement portion and the second engagement portion to each other is less than a second length between the first portion of the connection portion and the second portion of the connection portion in a connected state in which the connection portion connects the first engagement portion and the second engagement portion to each other.

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